

PRELIMINARY ASSESSMENT  
RAY WICHERT PROPERTY  
CLINTON, OKLAHOMA

July 29, 1992

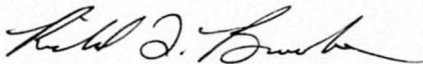
OKLAHOMA STATE DEPARTMENT OF HEALTH

Prepared By



Tim Daly, University of Oklahoma Intern

Reviewed & Approved By



Richard L. Brooks, Sr. Environmental Specialist

PRELIMINARY REPORT  
This does not constitute  
final opinion of EPA

Reviewed By: \_\_\_\_\_

DATE \_\_\_\_\_

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## I. Introduction

The Oklahoma State Department of Health (OSDH) is tasked by the U.S. Environmental Protection Agency (EPA), as authorized by CERCLA and as amended by SARA, under the Multi-Site Cooperative Agreement (CA# V-00645-01) to conduct a preliminary assessment (PA) of the Ray Wichert Property (CERCLIS ID# not yet assigned). As depicted in Figure 1 (Reference 1), this site is approximately a one mile south of the City of Clinton, Custer County, Oklahoma. The primary purpose for this PA is to assess the immediate or potential threat of wastes at the site that may have an impact on public and environmental health and to collect information sufficient to support a decision regarding the need for further action under CERCLA/SARA. The scope of this investigation includes the review of available information from the OSDH files and conducting a comprehensive target survey.

## II. Site Description, Operational History, and Waste Characteristics

### *Site Description*

The Ray Wichert Property is primarily located in the NE4 SEC27 T12N R17W I.M. CUSTER COUNTY OK (Reference 1, 2). The two (2) acre site has the coordinates of 35° 29' 24.38" north latitude and 98° 58' 41.03" west longitude (Reference 2). The site is a little less than one (1) mile south of the City of Clinton. The dump is not active and is currently owned by the Oklahoma Bank and Trust Company of Clinton, Oklahoma. (Reference 3, 4). The Ray Wichert Property had apparently operated as a dump between 1969 to 1987 (Reference 3). The site is in a commercial setting (Reference 3). The nearest residence is approximately one tenth (1/10) of a mile directly west of the site (Reference 1, 3). The nearest active domestic well is approximately two and a half (2 1/2) miles to the northeast of the site (Reference 1).

### *Operational History*

According to the Quit Claim Deed dated 10/12/87 between Ray Wichert, Peggy Jo Wichert, and Wic-Hert Inc., and Oklahoma Bank and Trust Company of Clinton, Oklahoma, the property, approximately 2.0 acres with a fill of 6 to 8 feet deep, is now owned by the Oklahoma Bank and Trust Company (Reference 4). The person who apparently owned the property originally was Earl Smith. Mr. Smith went bankrupt and Ray Wichert acquired the property. Mr. Wichert then too went bankrupt and had to relinquish the land. The property was then finally sold at an auction on August 25, 1987 to the Oklahoma Bank and Trust Company of Clinton Oklahoma. They currently retain ownership of the property (Reference 4).

At the time of construction, the site had been excavated and was apparently around fifteen (15) feet lower than the east boundary which runs parallel to the railroad track (Reference 3). The property has been used "in the past" as a disposal site for concrete, construction, and asphalt in the City of Clinton. The site has presumably been contaminated with radium by rubble left from a airplane dial refurbishing plant called Sooner Dial Co. of Clinton which is

approximately one (1) mile from the site. Sooner Dial Co. used paint containing radium due to its luminous characteristics. Mr. Grubb, the owner of the Sooner Dial Co. property claims that he hired Sugar Creek Transport, owned by Bill Warner, to haul the rubble off, and that it was Warner who chose to take it to the Ray Wichert Property. According to Mr. Grubb, the "rubble site" was owned by Earl Smith, who openly allowed people to dump dirt, etc. The drainage of surface water is to the north toward the intermittent water course. Multiple samples were taken from the site at different times to determine the extent of contamination on the property. In all of the tests, the results conveyed that the levels of contamination were high enough to warrant removal (Reference 4).

On September 24, 1990, the OSDH sent a letter to the Oklahoma Bank and Trust Company informing the bank of its responsibility to remediate the radiation waste on the property they own, referred to as the "Sooner Dial Co. Rubble site". However, Al Wood, Vice-President of Oklahoma Bank and Trust, disagrees with the claim that they are responsible for the cost of an environmental assessment without "something more than speculation" as to possible contamination. However, field data taken in the past shows a concern for levels of radiation on site (Reference 4).

#### *Waste Characteristics*

There are multiple sources of concern that need to be identified and remediated. The first source is the radium contamination due to its radioactivity and its toxicity. There were numerous areas that had elevated readings of radioactivity (Reference 5). The rubble is located within an approximate one acre area of the site (Reference 3). The majority of the rubble is assumed to be from the Sooner Dial Co. site (Reference 3).

Radium is a radioactive earth metal that is brilliant white and tarnishes in air. It decomposes in water and has a melting point of 700° Fahrenheit and a boiling point of 1737° Fahrenheit. It is highly dangerous, and must be kept heavily shielded and stored away from possible dissemination by explosion, flood, etc. It is considered to be a common air contaminant and a highly radiotoxic element. Inhalation, ingestion, or bodily exposure to radium can lead to lung cancer, bone cancer, osteitis, skin damage and blood dyscrasias (Reference 5). Radium replaces calcium in the bone structure and is a source of irradiation to the blood forming organs. The ingestion of luminous dial paint prepared from radium was the cause of death of many of the early dial painters before the hazard was fully understood.  $^{226}\text{Ra}$  decays to  $^{222}\text{Rn}$  via alpha waves and therefore is considered the parent of radon (Reference 5).

The next source of concern are drums that were found on sight. There were six (6) unmarked drums. The majority of the drums were obviously under pressure and had expanded, but at least one of the drums had ruptured and had leaked an unknown substance. Stressed vegetation marked the area where the leaking had occurred (Reference 3). The final source of con-



cern is a removed underground storage tank (UST) that was above ground. It was estimated to be a 5000 gallon tank. It is unknown if the tank ever had or does contain any hazardous materials (Reference 3).

05-12

### III. Pathway and Environmental Hazard Assessment

#### *Groundwater*

The site, at the time of construction, had been lowered apparently fifteen feet as compared to the west embankment and been covered with a layer of clay. The depth of the clay has not been determined. Under this clay is a layer known as the Terrace Deposits. Terrace Deposits are stream-laid deposits of sand, silt, clay, gravel, and volcanic ash. Its thickness ranges from 0 to about 120 feet. Underlying the Terrace Deposits is the Cloud Chief Formation. It is characterized as being a reddish-brown to orange-brown shale, interbedded with siltstone and sandstone in the middle part and some dolomite and much gypsum in the lower part of the formation. Its thickness is around 400 feet, thinning northward to about 175 feet. The Whitehorse Group forms the next underlying layer. The Whitehorse Group is predominantly orange-brown, fine-grained sandstone. The Rush Springs Formation and the Marlow Formation comprise the Whitehorse Group. The Rush Springs Formation ranges in thickness from 300 feet, thinning northward to about 186 feet. The Marlow Formation, although not as thick, ranges from 100 to around 130 feet thick, gradually thinning to the north. This formation has 2 gypsum and (or) dolomite beds in the upper 20 feet of the formation. Two thin, pink shales occur. The first is about 1 foot below the top and the second is about 55 feet above the base. In the middle of the formation about 25 feet below the previously mentioned gypsum layers and about 85 to 95 feet above the base is the Verden Sandstone Lenticle. It is a coarse-grained, calcareous, fossiliferous sandstone. (Reference 6)

Aquifers are associated with the Terrace Deposits and the Rush Sand Spring Formation, and in the vicinity of the site, they; therefore, will be viewed as one aquifer for the duration of this report. Along large streams, deposits consist of clay and silt at the surface which form the Terrace Deposits. It then grades downward into coarse sand and gravel at the base. Water is available from saturated layers of sand and gravel, and yields are highest where the coarse sand and gravel layers are thickest. In areas where an alluvium or terrace aquifer overlies the Rush Springs Sandstone, water is available from either aquifer. In the vicinity of the site the deposits are thin and yields an average 280 gallons per minute (gpm). The Rush Springs Sandstone consists mainly of fine-grained sandstone with some dolomite, shale, and gypsum beds. The Marlow Formation, which is inclusive with the Rush Springs Formation, consists of fine-grained sandstone with much gypsum and shale. The bedrock aquifer in the vicinity of the site is thick, but is assumed to be relatively close to the surface. In addition, it yields an average of 14 gallons per minute (gpm) at the nearest vicinity of the site (Reference 6).

There are private water wells within the area of interest (Reference 3, 7). Populations served by private wells are described below (References 7). The nearest well used for drinking water is about two and a half (2 1/2) miles to the northeast from the site, serving an estimated population of 2.55 (Reference 3, 7, 8, 9). Based on above information, all groundwater users are considered secondary targets.

Distance from Site (mi)	Estimated Populations Served by Private Wells
On-site	0
0 - 1/4	0
1/4 - 1/2	0
1/2 - 1	0
1 - 2	0
2 - 3	2.6
3 - 4	5.1
<b>Total</b>	<b>7.7</b>

### *Surface Water*

The nearest perennial stream is just greater than two miles away from the site following the surface water migration route. Accordingly, there is not considered to be a probable point of entry (PPE). Although the general vicinity of the site is outside the flood plane, the site itself might actually be within the 500 year flood plane due to its lowered elevation (Reference 3, 10, 11). The normal annual total precipitation in the site's region is about 25 inches per year (Reference 6).

There are no active surface water intakes located within the 15 mile target distance. Due to the excavated nature of the site, it is possible for the site to be in the flood plane and therefore could have the endangered species habitats associated with it. Habitats of the endangered/threatened species listed below are known to be in Custer County, however; it is unknown if any of these habitats are actually associated with the surface water migration route (Reference 12).

<i>Species</i>	<i>Federal Status</i>
Bald eagle	Endangered
Whooping crane	Endangered
Interior least tern	Endangered
Peregrine falcon	Endangered
Arkansas River shiner	Candidate
Arkansas River speckled chub	Candidate
Texas horned lizard	Candidate
White-faced ibis	Candidate
Ferruginous hawk	Candidate
Long-billed curlew	Candidate
Western Snowy plover	Candidate

### *Soil Exposure*

As per the PA Guidance Document, on-site soil contamination is assumed. The site is non-active. There is no one currently working on site (Reference 3). There are no residences, schools, day-care centers within 200 feet or within the site-boundaries (Reference 1, 3, 4). Due to the lack of information, it is assumed (as per the PA Guidance Document) that all of Custer County's terrestrial endangered/threatened species listed under the surface water pathway are on-site (Reference 12).

### *Air*

Due to the composition of the rubble, the heavy vegetation associated with the area, and the excavated landscape, an air release is not suspected. The estimated population and wetland acreage within 4 miles from the site is described below (References 1, 3, 7, 8, 9, 13). There are no "designated" wetlands on-site (Reference 11). As per the PA Guidance Document, it is assumed that the all of Custer County's endangered/threatened species, listed under the surface water pathway, have habitats on site (Reference 12). In addition the prairie mole cricket, which is located in Washita county, could possibly be as near as 1 3/4 miles from the site (Reference 1,12).

Distance from Site (mi)	Estimated Residing Population	Estimated Wetland Acreage
On-site	0	0
0 - 1/4	71.4	1
1/4 - 1/2	63.8	2.5
1/2 - 1	1969	9
1 - 2	3703	40
2 - 3	3124	60
3 - 4	140.3 (Custer) 50.6 (Washita)	75
<b>Total</b>	<b>9122.1</b>	<b>187.5</b>

### **IV. Summary and Conclusion**

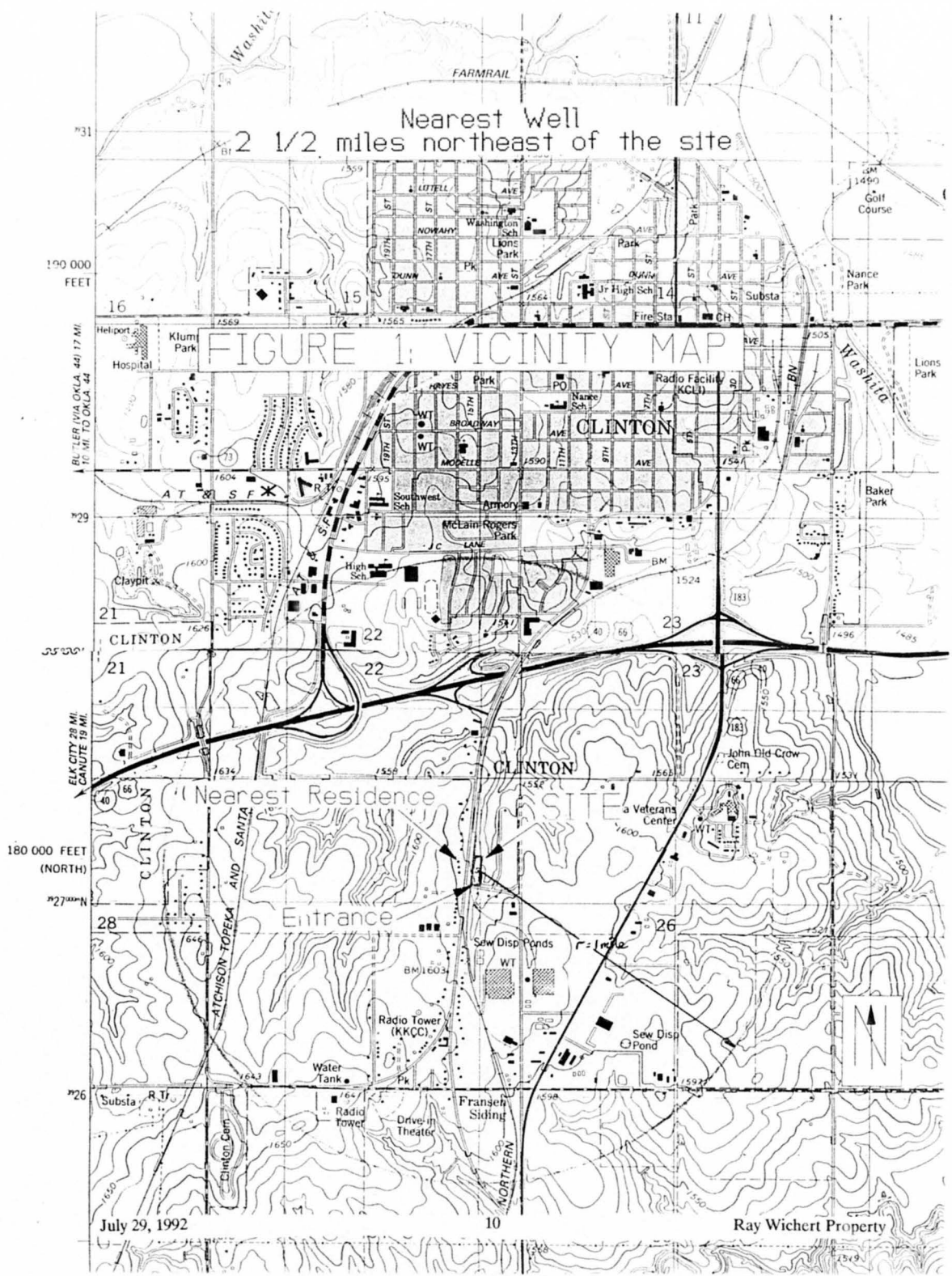
An excavated area in Custer County, Oklahoma had operated as a dump site apparently between 1969 to 1987. The site is known to contain rubble contaminated with radioactive radium, six unlabeled drums, and an unearthed underground storage tank; therefore, the surface may be adversely effected. The surface water has a potential for contamination via floods which poses a threat to the environment and to human targets through food chain contamination. The site is inactive and is heavily vegetated; therefore, the likelihood of human exposure via soil and air is probably minimal. Additionally, the groundwater pathway is also of minimal concern because the nearest domestic well is over two miles from the site.

## V. Figures

July 29, 1992

Nearest Well  
2 1/2 miles northeast of the site

FIGURE 1: VICINITY MAP



Nearest Residence

Entrance



Legend	
Rubble	
Drums	
Fuel Islands	
Stressed Vegetation	
Buildings	
Truck/Car Wash	
Residences	
Stream	

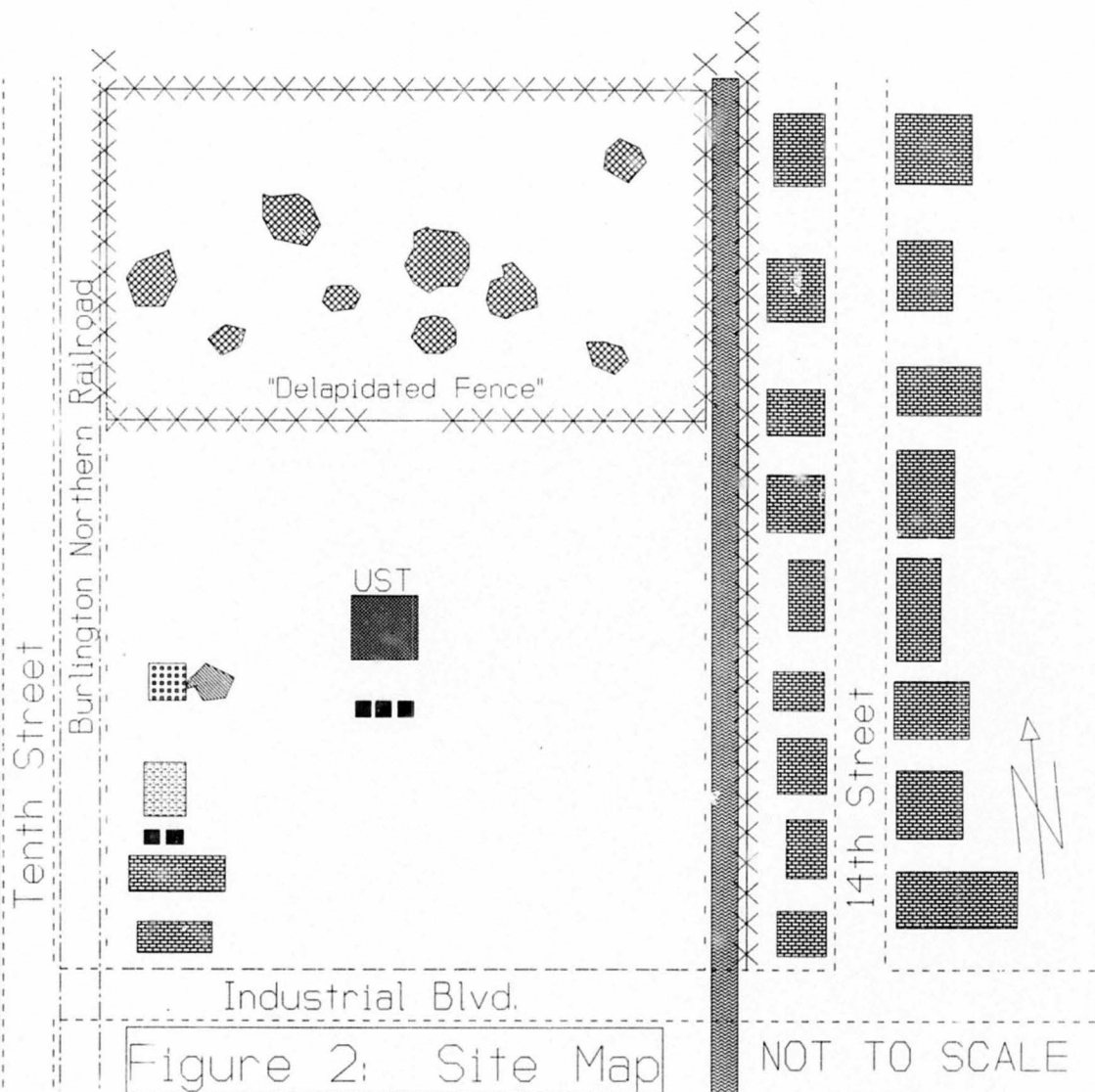


Figure 2: Site Map

0 5 1 0



## VI. Photodocumentation Log

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July 29, 1992

12

Ray Wichert Property

Photographer: Richard L. Brooks<sup>tab</sup> Witness: Tim Daly<sup>TD</sup>  
Date: July 15, 1992 Direction: northwest



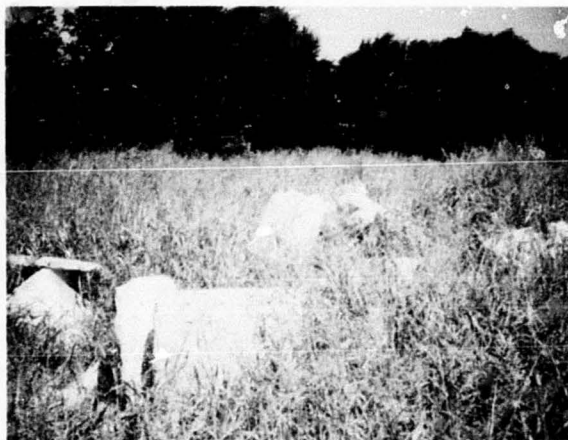
**Comments:** Photograph #1 (matches slide # 3). Picture is of an unearthed underground storage tank on site.

July 29, 1992

13

Ray Wichert Property

Photographer: Richard L. Brooks<sup>LAB</sup> Witness: Tim Daly<sup>T.D.</sup>  
Date: July 15, 1992 Direction: east



**Comments:** Photograph #2 (matches slide # 7). Picture is of rubble (averaging 3 feet tall) assumed to be from Sooner Dial Co. and surrounded by heavy vegetation.

July 29, 1992

14

Ray Wichert Property

Photographer: Richard L. Brooks <sup>RLB</sup> Witness: Tim Daly <sup>T.D.</sup>  
Date: July 15, 1992 Direction: west



**Comments:** Photograph #3 (matches slide # 13). Picture is of six (6) unlabeled drums and stressed vegetation associated with a leaked substance from the drums.

Photographer: Richard L. Brooks <sup>7/13</sup> Witness: Tim Daly <sup>7/15</sup>  
Date: July 15, 1992 Direction: south



**Comments:** Photograph #4 (matches slide # 15). Picture is of three (3) fuel islands and an apparently inactive semi-truck repair and cleaning facility.

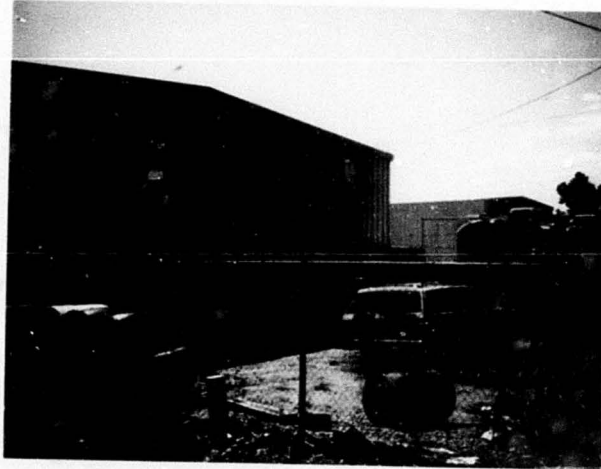
July 29, 1992

Photographer: Richard L. Brooks <sup>R.L.B.</sup> Witness: Tim Daly <sup>T.D.</sup>  
Date: July 15, 1992 Direction: northwest



**Comments:** Photograph #5 (matches slide # 17). Picture is of the nearest residences across Tenth Street and the Burlington Northern Railroad.

Photographer: Richard L. Brooks <sup>RLB</sup> Witness: Tim Daly <sup>T.D.</sup>  
Date: July 15, 1992 Direction: southeast



**Comments:** Photograph #6 (matches slide # 19). Picture is of the nearest apparently active facility 66 Music and Vending Inc.



## VII. List of References

1. U.S. Geological Survey. 7.5 minute topographic quadrangle maps of: Clinton, Okla. 1983. Bessie, Okla. 1983. Dill City NE, Okla. 1983. Stafford, Okla. 1983.
2. Karen Khalafian. USEPA. Standard Operating Procedure to Determine Site Latitude and Longitude Coordinates. April 28, 1992. Calculation Worksheet for the Ray Wichert Property.
3. Tim Daly, University of Oklahoma Intern. *Memorandum: Reconnaissance of the Ray Wichert Property - Clinton, Oklahoma.* July 15, 1992.
4. Tim Daly, University of Oklahoma Intern. *Memorandum: Operational History.* July 13, 1992.
5. N. Irving Sax. *Dangerous Properties of Industrial Materials* 6th edition. Copyright 1984.
6. Oklahoma Geological Survey. *MAPS HA-5 Reconnaissance of the Water Resources of the Water Resources of the Clinton Quadrangle, West-Central Oklahoma.* The University of Oklahoma, Norman. 1976.
7. Tim Daly, University of Oklahoma Intern. *Memorandum: To Ray Wichert Property PA Air and Groundwater Targets.* July 16, 1992.
8. United States Department of Commerce. *Selected Population and Housing Characteristics: 1990.* Custer and Washita Counties, Oklahoma.
9. GEMS-1980 Population Data for Ray Wichert Property. Compiled by RLB, OSDH. May 12, 1992.
10. Ken Morris, the Oklahoma Water Resources Board to Richard L. Brooks. *RE. A request letter dated May 14, 1992 regarding flood planes*
11. U.S. Department of the Interior. Fish and Wildlife Service. 7.5 minute wetland quadrangle maps of: Clinton, Okla. 1990. Bessie, Okla. 1990. Dill City NE, Okla. 1990. Stafford, Okla. 1990.

12. U.S. Fish and Wildlife Service. *Oklahoma Federal Listed and Proposed and Candidate Threatened and Endangered Species*. Custer County. June 1990.
13. Karen Khalafian. *Wetland Acreage Worksheet*. Sheet: *Ray Wichert Property*. June 22, 1992.

## VIII. References

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8

**REFERENCE 1**

0

1

2

3

## OVERSIZE DOCUMENT

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Oversized document number:

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SF SA YOL OI

on the roll of 35mm film.

Titled:

RL-HS-R-OKMCOI

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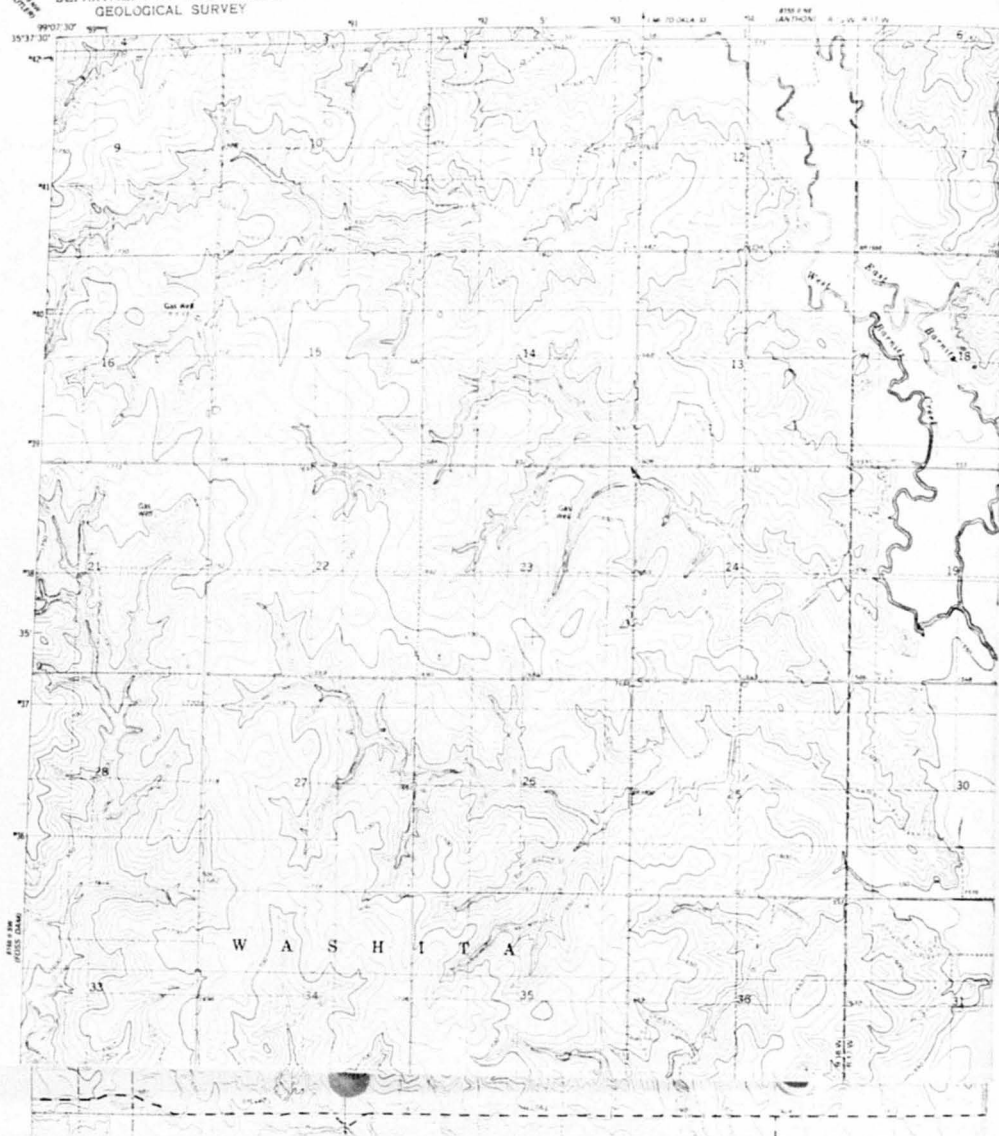
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UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

STATE OF ARIZONA



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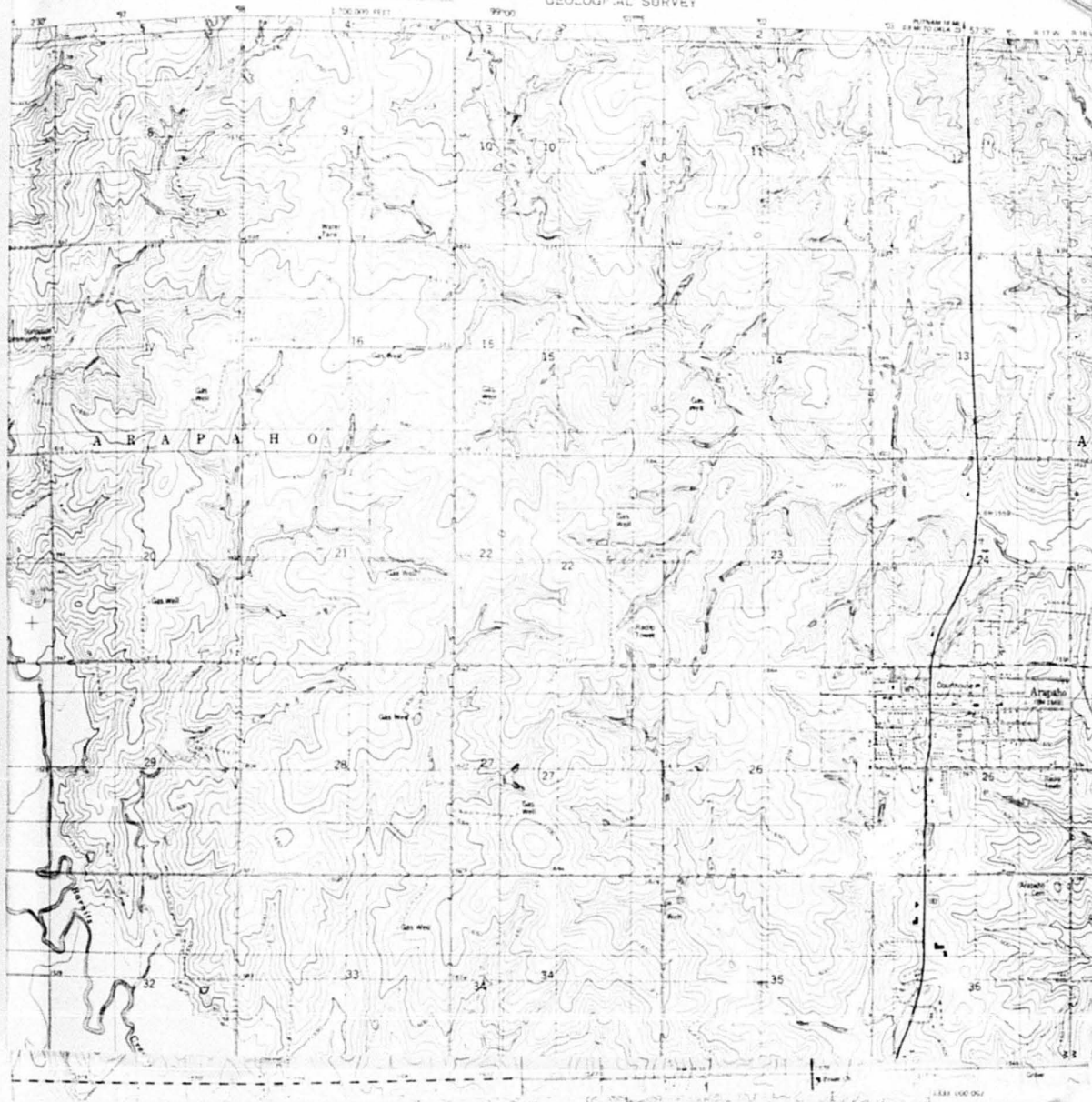
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STAFFORD QUADRANGLE  
OKLAHOMA-CUSTER CO  
7.5 MINUTE SERIES (TOPOGRAPHIC)  
DEPARTMENT OF THE ARMY  
GEOLOGICAL SURVEY

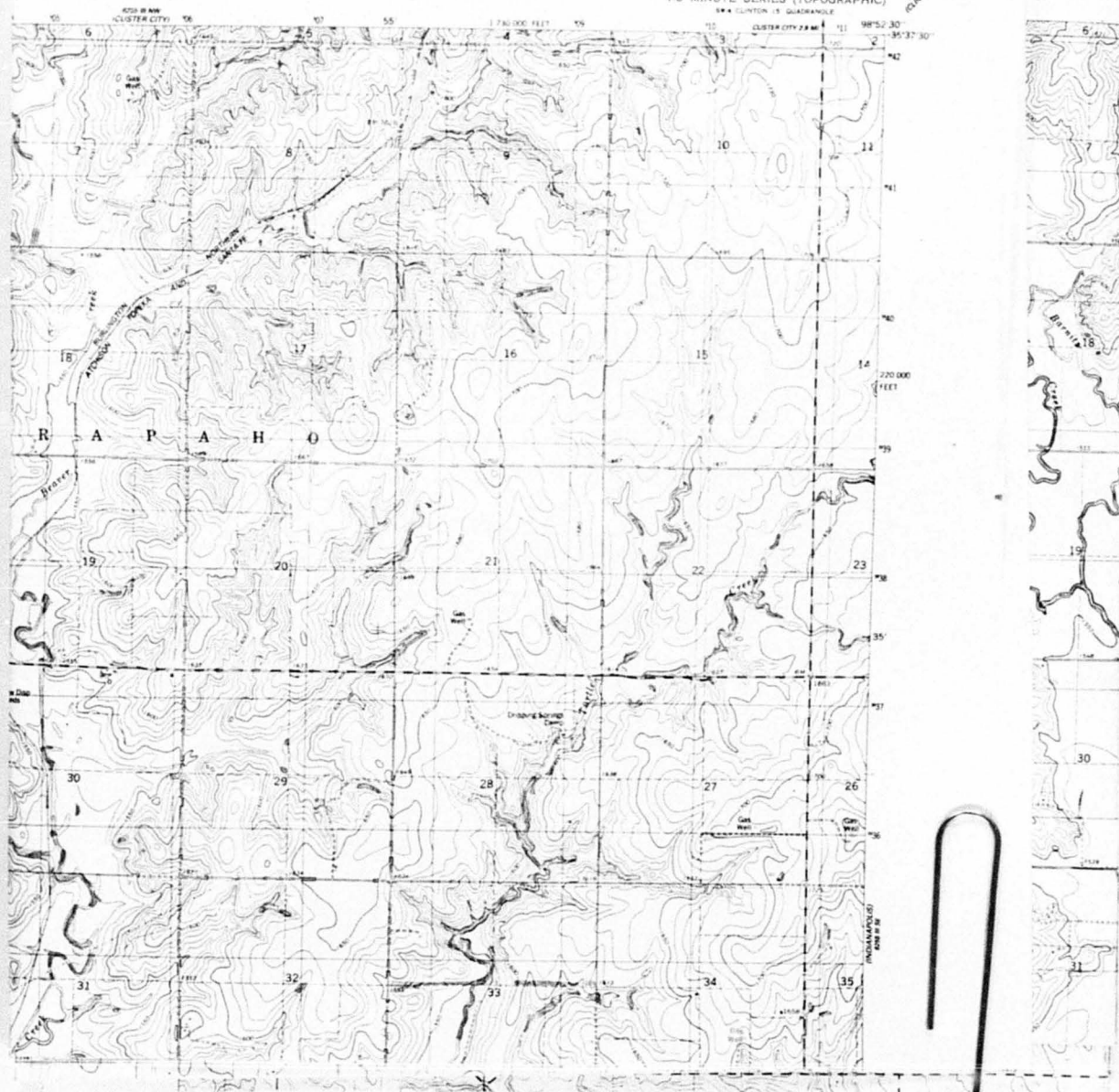
UNITED STATES  
DEPARTMENT OF THE ARMY  
GEOLOGICAL SURVEY



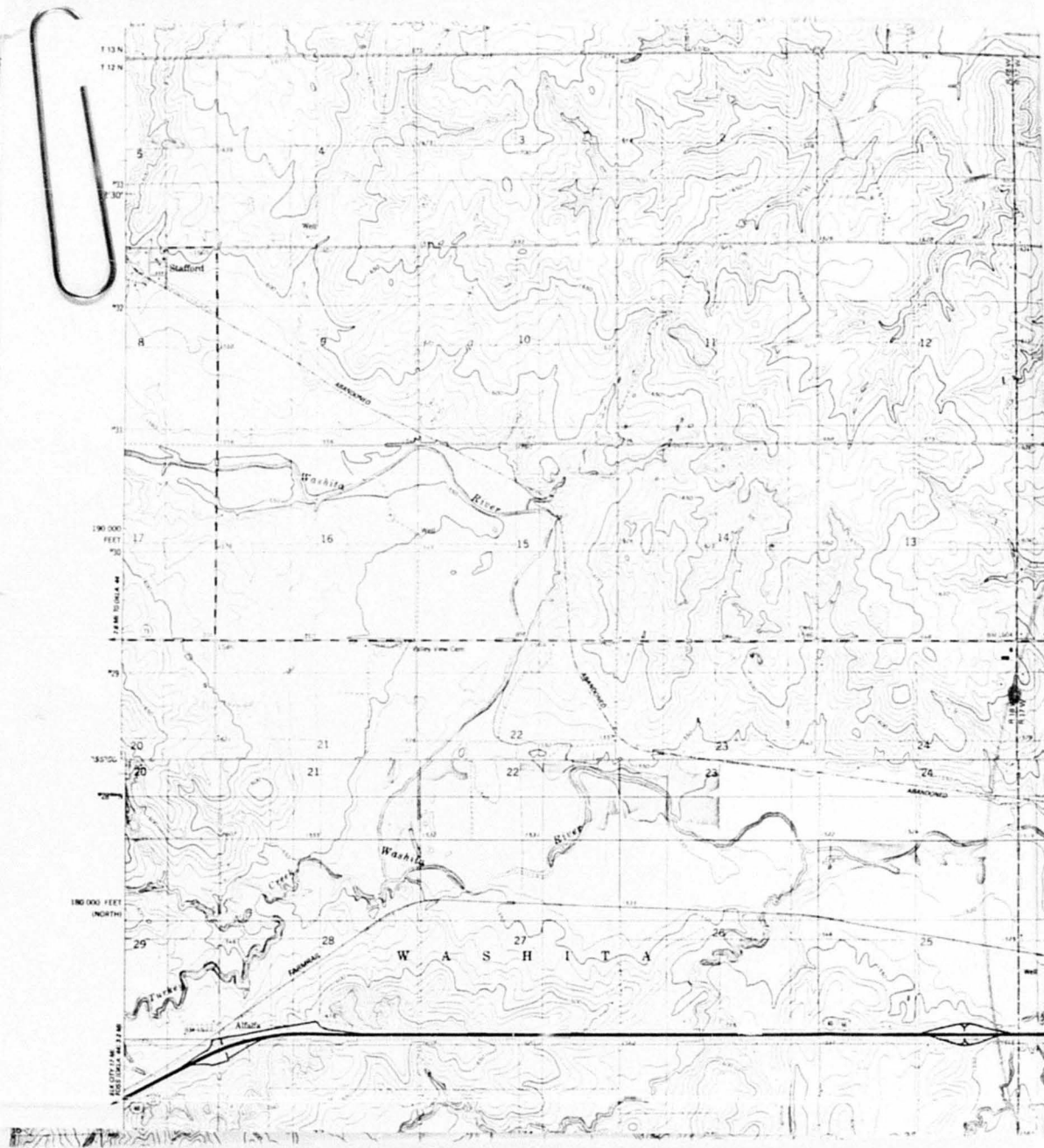
071712

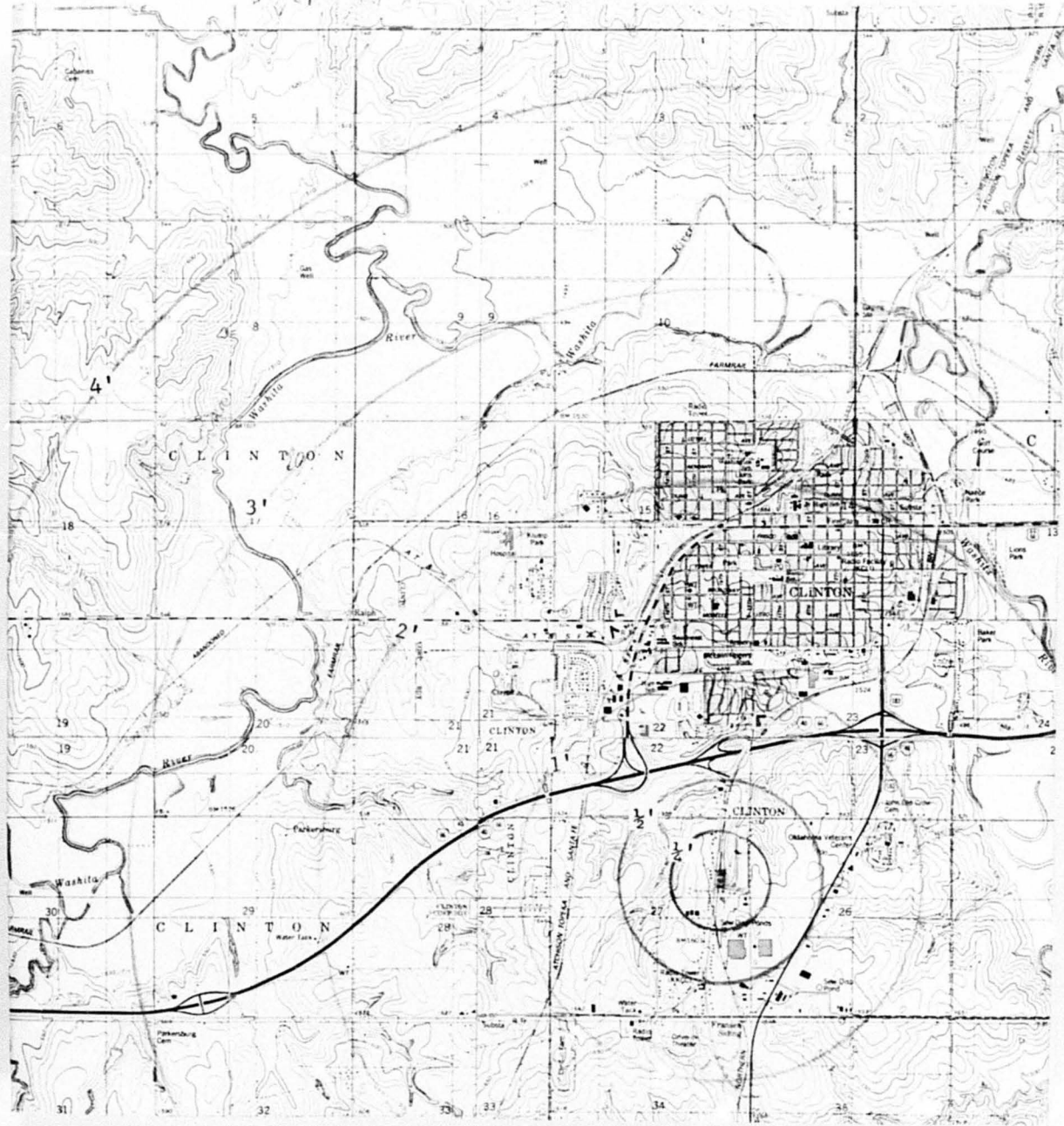


CLINTON QUADRANGLE  
OKLAHOMA-CUSTER CO  
7.5 MINUTE SERIES (TOPOGRAPHIC)  
1:250,000



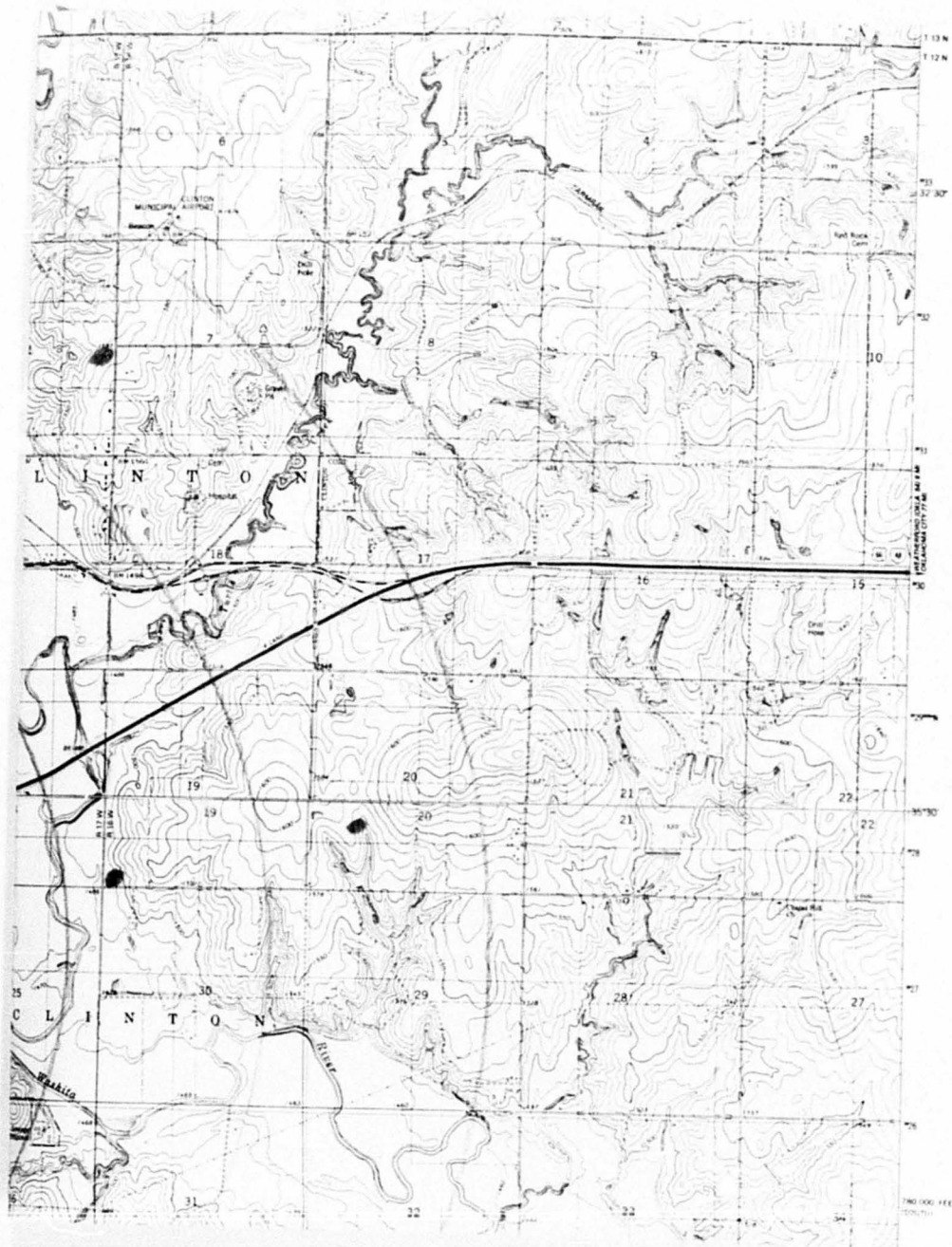
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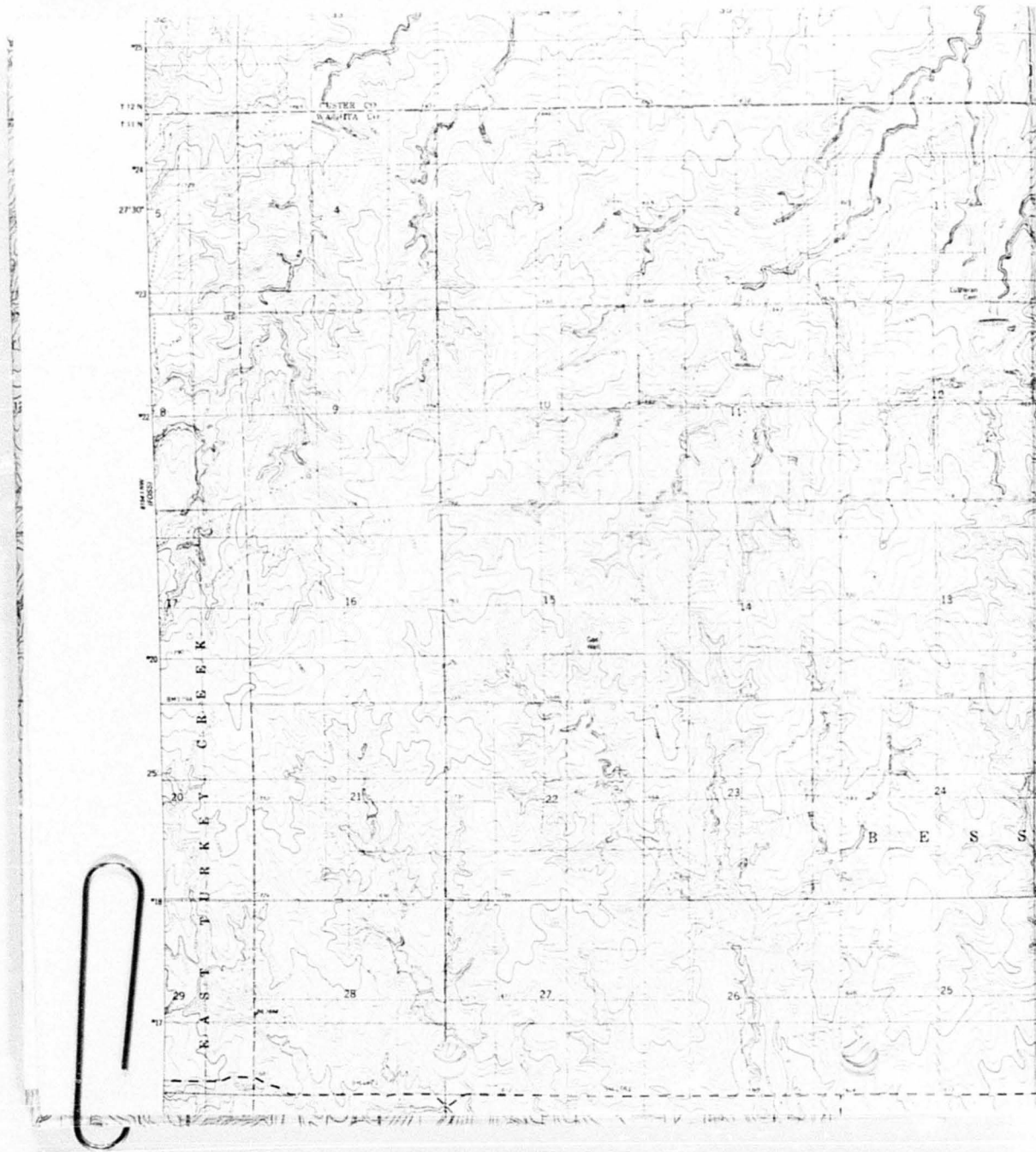
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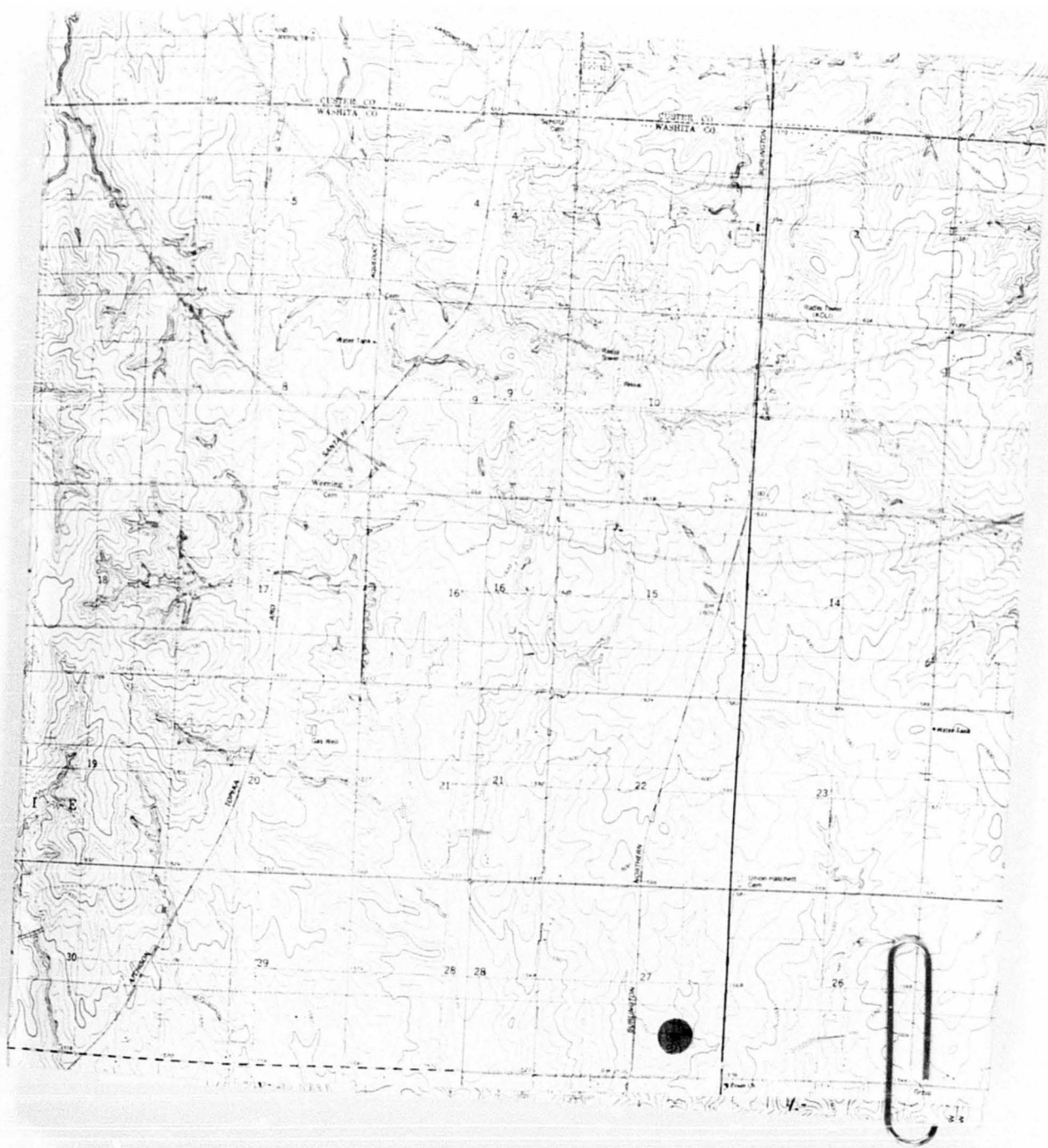
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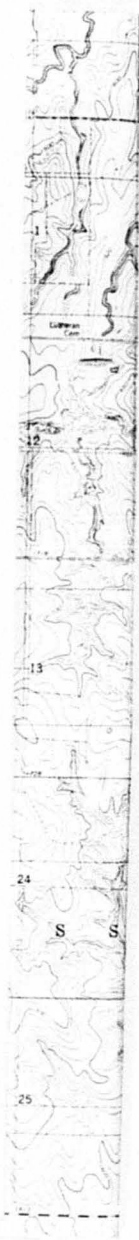
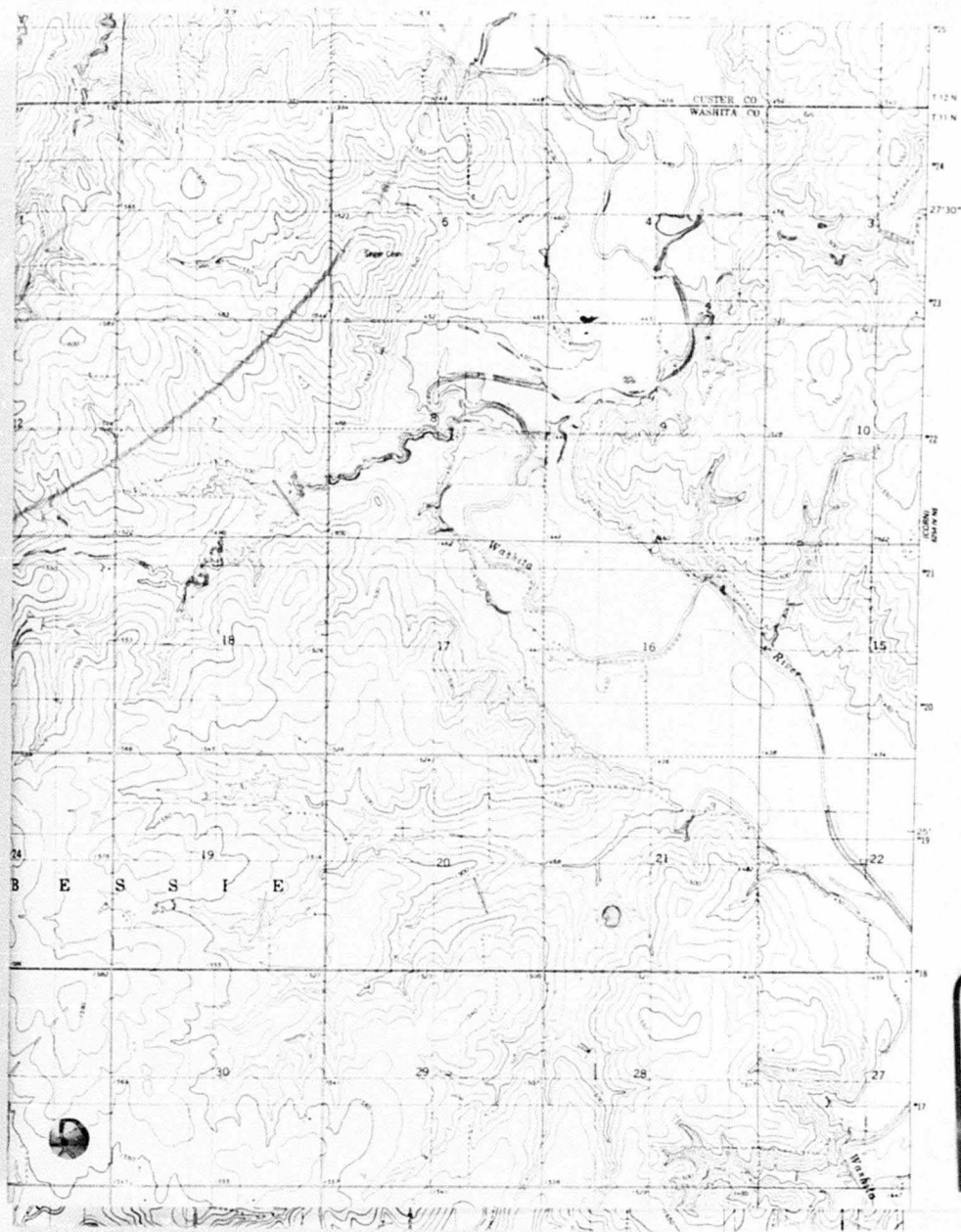




0437







1749







ROAD CLASSIFICATION  
 Primary highway  
 hard surface  
 Secondary highway  
 hard surface  
 Interstate Route  
 Light-duty road, hard or  
 improved surface  
 Unimproved road  
 U.S. Route  
 State Route



**3509941**  
**DILL CITY NE, OKLA.**  
 NE 1/4 DILL CITY 14 QUADRANGLE  
 35099 (1) 14-024

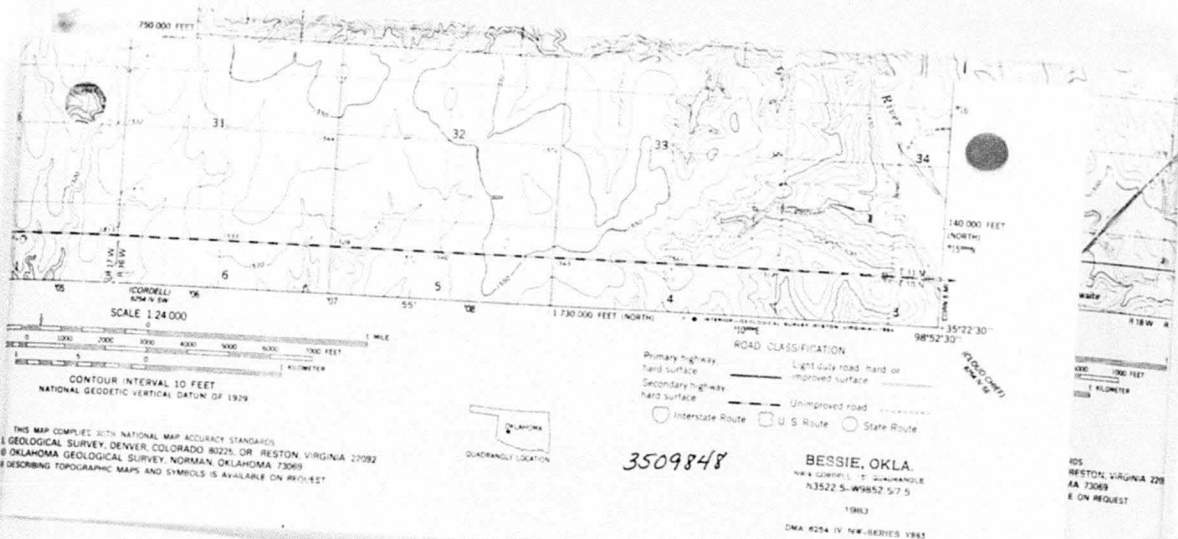
1983

OKLA. BLS-1 (1) 14-024

Mapped, edited, and published by the Geological Survey  
 Control by USGS and NOS/NOAA  
 Topography by photogrammetric methods from aerial photographs  
 taken 1980. Field checked 1982. Map edited 1983.  
 Projection: Oklahoma coordinate system, south zone  
 (Lambert conformal cone)  
 10,000-foot grid lines based on Oklahoma coordinate  
 system, south and north zones  
 1000-meter Universal Transverse Mercator grid, zone 14  
 1983 North American Datum  
 To place on the predicted North American Datum 1983,  
 move the projection lines 2 meters south and  
 32 meters east as shown by dashed corner ticks.  
 Four red dashed lines indicate selected fence and field lines where  
 generally visible on aerial photographs. This information is unchecked.



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**REFERENCE 2**

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APPENDIX E

STANDARD OPERATING PROCEDURE  
TO DETERMINE SITE  
LATITUDE AND LONGITUDE COORDINATES

HAZARDOUS SITE EVALUATION DIVISION  
SITE ASSESSMENT BRANCH  
U.S ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C.

September 1991

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LATITUDE AND LONGITUDE CALCULATION WORKSHEET #2  
LI USING ENGINEER'S SCALE (1/60)

SITE NAME: Raymond M. Property CERCLIS #: \_\_\_\_\_

AKA: \_\_\_\_\_ SSID: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY: Clinton STATE: OK ZIP CODE: \_\_\_\_\_

SITE REFERENCE POINT: \_\_\_\_\_

USGS QUAD MAP NAME: Bessie TOWNSHIP: 12 N/S RANGE: 17 E/W

SCALE: 1:24,000 MAP DATE: 1983 SECTION: 1/4 NW 1/4 SE 1/4 NE 1/4 Sec 7

MAP DATUM: 1927 1983 (CIRCLE ONE) MERIDIAN: \_\_\_\_\_

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 98° 52' 30" LATITUDE: 35° 22' 30"

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 98° 57' 30" LATITUDE: 35° 27' 30"

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 345

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

$$A \times 0.3304 = \underline{113.98} "$$

C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 01° 54' 38"

D) ADD TO STARTING LATITUDE: 35° 27' 30.00" + 01° 54' 38" =

SITE LATITUDE: 35° 23' 24.38"

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 21

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

$$A \times 0.3304 = \underline{7.05} "$$

C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 01° 11' 03"

D) ADD TO STARTING LONGITUDE: 98° 57' 30.00" + 01° 11' 03" =

SITE LONGITUDE: 98° 58' 41.03"

INVESTIGATOR: V. M. M. M. DATE: 04/28/02



SITE NAME: Raymond Wicket Property  
 GEOLOGICAL SURVEY

NUMBER: \_\_\_\_\_



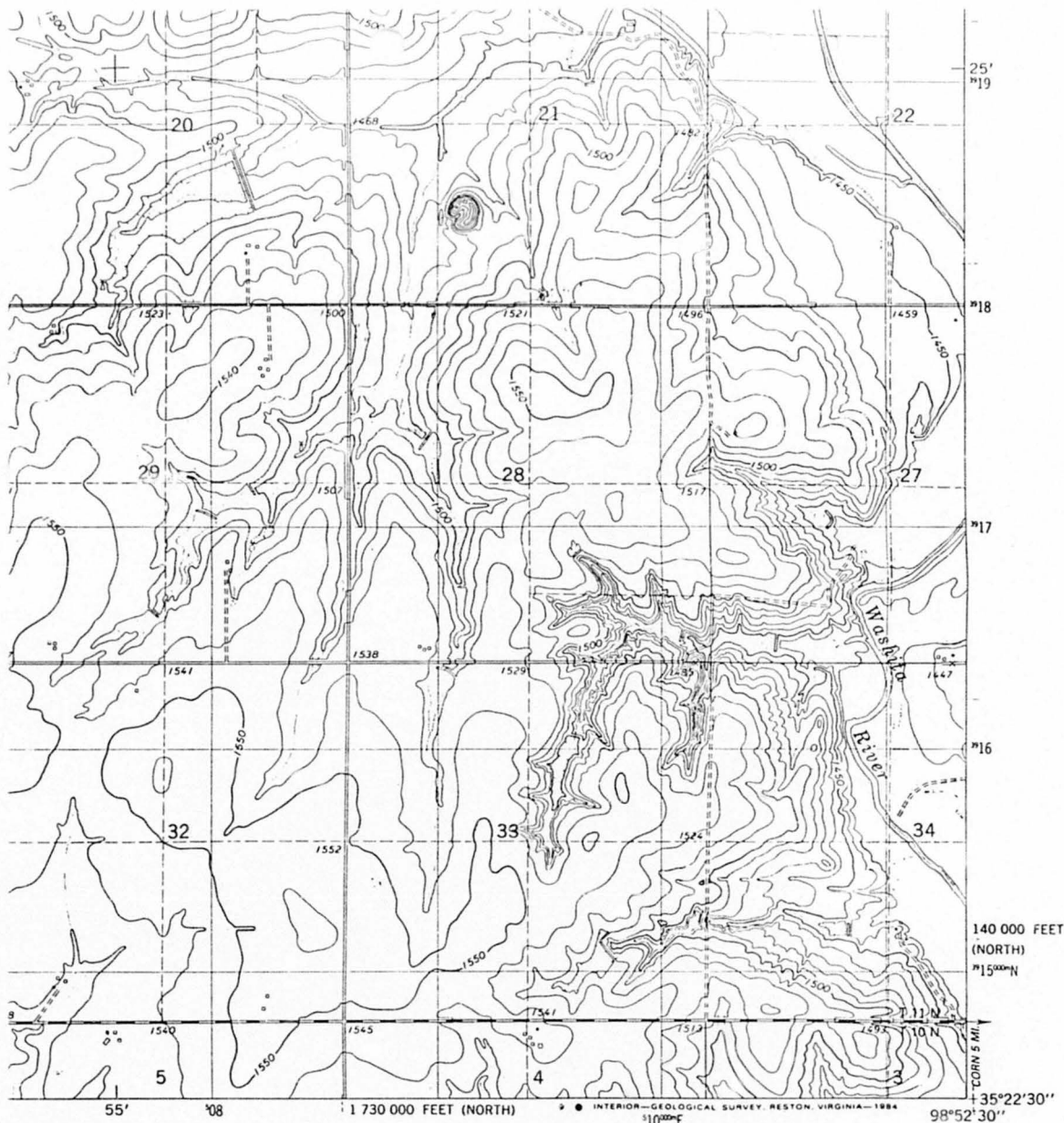
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SCALE: 1:24,000

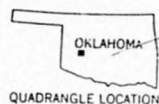
COORDINATES OF LOWER RIGHT-HAND CORNER OF 2.5-MINUTE GRID:

LATITUDE: 35° 07' 00" N LONGITUDE: 101° 00' 00" W





1 MILE



VIA 22092

ROAD CLASSIFICATION

Primary highway, hard surface	Light-duty road, hard or improved surface
Secondary highway, hard surface	Unimproved road
○ Interstate Route	○ U. S. Route    ○ State Route

3509848

BESSIE, OKLA.

NW¼ CORDELL 15' QUADRANGLE  
N3522.5-W9852.5/7.5

1983

DMA 6254 IV NW-SERIES V883

**REFERENCE 3**



## MEMORANDUM

**DATE:** July 15, 1992  
**TO:** Ray Wichert Property PA File  
**FROM:** Tim Daly, O.U. Intern  
**RE:** Sooner Dial/Ray Wichert Property On/Off-Site Reconnaissance

On the above date at 8:00 a.m., the following OSDH officials traveled to Clinton, Oklahoma for the purpose of conducting an on/off-site reconnaissance of the Sooner Dial site and the Ray Wichert site, Richard Brooks, Gary Ammon, David Crow, and Tim Daly. On the way to Clinton, Gary told me some background information that dealt with the Ray Wichert Site. He told me that at the time of construction, the site had been excavated and was lower than the rest of the landscape.

We arrived in Clinton at approximately 9:00 a.m., and first stopped at the County Health Department to meet with Beth Ledbetter, county sanitarian. Next, the five of us drove to the Sooner Dial site. Here we conducted a site reconnaissance and is to be included in another Preliminary Assessment currently being composed.

Following our reconnaissance of the Sooner Dial site, we drove to the Ray Wichert Property where Sooner Dial rubble was allegedly dumped. The entrance to the site is off Industrial Boulevard at the south end. There is two sections associated with the property. The first section is a two acre area with no fence marking its boundaries. Heavy vegetation covers the section. At the south end of the two acre section stands two buildings, apparently inactive, and a structure that apparently used to function as a truck/car wash station. It is assumed that there are no workers on site. Two fuel islands (gas pumps) lie between the buildings and the truck/car wash. Walking to the north, we observed three (3) more fuel islands and a large unearthed underground storage tank (UST). It was estimated to be a 5000 gallon tank, but it was undetermined if there were any substances contained inside. The west side of the property has a fifteen (15) foot embankment and serves as the west boundary to the property. The embankment is present due to the fact that the site had been lowered by excavation. Next to this embankment, directly west of the three fuel islands and the UST, is six (6) unlabeled drums. The drums seemed to be under pressure and it was observed that at least one had ruptured and spilled an unknown substance. Stressed vegetation was apparent where the spill had occurred. Running north on the east side of the property is another embankment which leads down to a stream. Across the stream lies a fence that serves as the east boundary, and separates buildings used for business that run along 14th Street from the Wichert Property. North beyond the UST, multiple orange flags are stuck in the ground. Gary Ammon informed us that he had put the flags there and that they mark areas of elevated levels of radiation. Continuing north we arrived at a delapidated barbwire fence which serves as the northern boundary for the two acre area.

Entering the second section between two posts that had no barbwire and serves as an entrance, we noticed that the area is even more heavily vegetated than the first area. This section measures approximately .88 of an acre and is sectioned off by a delapidated fence.

Piles of rubble averaging around three (3) feet high are scattered across the section. Gary Ammon told us that a lot of the piles are rubble from the Sooner Dial site, but some are remnants of an old hospital that had been destroyed. Gary measured over 600 micro R/hour of radioactivity where background in the area is 8-9 micro R/hour. The majority of the radioactive contamination is contained in this .88 acre area.

After our on-site reconnaissance, we located the nearest business and residence. We went just east of the site and counted the number of businesses located on 14th street which is adjacent to the property. There is a total of seventeen (17) businesses and an estimated twenty five (25) workers. The nearest business to the site is the 66 Music and Vending Inc. building. Its address is 1420 S 14th Clinton. From there we traveled west to Tenth Street. The nearest residence is located less than one tenth (1/10) of a mile west of the site. It has an estimated 2.55 residents living on the premises.

We concluded our site reconnaissance and returned to the County Health Department and answered any questions Mrs. Ledbetter had about the possible actions that might occur to both sites. Throughout the on and off site reconnaissance, appropriate pictures were taken.



**REFERENCE 4**

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## MEMORANDUM

**DATE:** July 27, 1992  
**TO:** Ray Wichert Property PA Site File  
**FROM:** Tim Daly, OSDH  
**RE:** Operational History References

Inclusive in this memo are references which report the operational history of the Ray Wichert Property.

- 1 *Quit Claim Deed.* dated 10/12/87. Sheriff's Deed showing ownership of Ray Wichert Property.
- 2 Robert L. Craig. *Memorandum.* April 23, 1992. Radium contamination on Ray Wichert Property.
- 3 Jimmy D. Givens. *Memorandum.* June 24, 1992. Phone conversation with Mark Schwartz.
- 4 Robert L. Craig. *Memorandum.* March 15, 1985. Project Summary on Sooner Dial.
- 5 Paul H. Brown. *Memorandum.* June 29, 1990. Radiation Survey of Sooner Dial.
- 6 *OSDH letter to Ray Wichert.* Report concerning samples taken on Wichert Property
- 7 *OSDH letter to Oklahoma Bank and Trust Company.* September 24, 1990.
- 8 Jimmy D. Givens. *Memorandum.* July 31, 1991. Concerning Sooner Dial Rubble site.

B

Source: Mark S. Schwartz, attorney; letter to Jimmy D. Givens, OSBIT staff attorney, 3/4/92

- the owner and operator of the site when the contamination took place was EDO Corporation & New York.

B

Source: Techrad Environmental Services, Inc. letter to Mark S. Schwartz, 2/21/92.

B+C were  
joined as one

- "It has been observed" that the major source of the radiation in the soil is from contaminated metal fragments within the soil.

- The plant ceased operation in 1969.

- Included in this source ~~are~~ are Proposed Site Characterization and Preliminary Remediation Plan from Techrad 2/21/92

D

Source: Newspaper article (Houston paper's name + date unknown)

- Silk screens used @ Summer D.A. to make the repaired instruments luminous again were sold at ~~an~~ auction and were found in Houston, Texas. The silk screens were discovered to have unacceptable levels of radiation

E

Source: Quit Claim Deed <sup>10/10/87</sup> between Ray Wickett, Pugh, Jo Wickett, and Wic-Hart, Inc (part of the Pugh part); and Oklahoma Bank and Trust Co. & Oklahoma, OK. (part of the second part)

Forward  
to  
info.

Assigned to  
the Site Remediation

proposed from 1st party → 2nd party  
look to make sure necessary for 1st party



BOOK 737 PAGE 132



128.

WHEREAS, on June 1, 1987, in Case No. C-86-243, in the

State of Oklahoma, Custer County, ss, Filed OCT 19 1987 9:34  
 Recorded in Book 737 Page 432-434 Evelyn Reed, County Clerk  
 Griftor Griftree Nephewal By Diana A. Savage Deputy

WHEREAS, on September 14, 1987, the District Court of Custer County, Oklahoma, in said cause confirmed and approved said sale and ordered said Sheriff to make, execute and deliver to said Oklahoma Bank and Trust Company a good and sufficient deed covering the property hereinafter described.

NOW, THEREFORE, I, Richard Mueller, Sheriff of Custer County, Oklahoma, in consideration of the premises, do



hereby convey to Oklahoma Bank and Trust Company, Clinton, Oklahoma, a corporation, its successors and assigns, the following described real estate located in Custer County, Oklahoma, to-wit:

A tract of land in the Northeast Quarter (NE/4) of Section 27, Township 12 North, Range 17, W.I.M., Custer County, Oklahoma, being described by metes and bounds as follows: Beginning at a point 1055.55 feet South and 545.88 feet West of the Northeast corner of said Northeast Quarter (NE/4) of Section 27; thence South 6° 07' 40" West a distance of 248.18 feet; thence North 83° 52' 20" West a distance of 160.0 feet; thence North 6° 07' 40" East along the Easterly right-of-way line of the S.L. & S.F. Railroad a distance of 231.0 feet; thence East 160.92 feet to the point of beginning, containing 0.8800 acre; and

A tract of land in the Northeast Quarter of Section 27, Township 12 North, Range 17, W.I.M., Custer County, Oklahoma, described by metes and bounds as follows: Beginning at a point 789.44 feet North and 633.82 feet West of the Southeast corner of said Northeast Quarter of Section 27, said point being on the North right-of-way line of Industrial Boulevard, Clinton, Oklahoma; thence North 81° 35' West along said North right-of-way line a distance of 160.13 feet to the East right-of-way line of the S.L. & S.F. Railroad, thence North 6° 07' 40" East along said East right-of-way line a distance of 541.30 feet; thence South 83° 52' 20" East a distance of 160.00 feet; thence South 6° 07' 40" West a distance of 547.70 feet to the point of beginning, containing 2.00 acres.

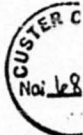
To Have and To Hold the same with all appurtenances thereunto belonging to said Oklahoma Bank and Trust Company, Clinton, Oklahoma, a corporation, its successors and assigns forever.

Dated this September 14, 1987.

*Richard Mueller*  
RICHARD MUELLER, SHERIFF OF  
CUSTER COUNTY, OKLAHOMA,

State of Oklahoma,  
County of Custer, :ss

Before me, the undersigned, a Notary Public in and for said County and State on this 14th day of September, 1987,



personally appeared Richard Mueller, Sheriff of Custer County, Oklahoma, to me known to be the identical person who is described in and who executed the within and foregoing Sheriff's Deed and acknowledged to me that he executed the same as Sheriff of Custer County, Oklahoma, as his free and voluntary act and deed for the uses and purposes therein set forth.

Given under my hand and seal the day and year last above written.

Richard Mueller  
Notary Public





QUIT CLAIM DEED

THIS INDENTURE, made this 12th day of October, 1987,  
between RAY WICHERT, PEGGY JO WICHERT, his wife, and  
WIC-HERT, INC., a corporation, parties of the first part,  
and OKLAHOMA BANK AND TRUST COMPANY, Clinton, Oklahoma, a  
corporation, party of the second part, WITNESSETH, that said  
parties of the first part, in consideration of the sum of  
TEN AND NO/100 DOLLARS (\$10.00) to them in hand paid, the  
receipt of which is hereby acknowledged, does hereby  
quitclaim, grant, bargain, sell and convey unto the said  
party of the second part all their right, title, interest,  
estate and every claim and demand, both at law and in  
equity, in and to the following described property situate  
in Custer County, State of Oklahoma, to-wit:

A tract of land in the Northeast Quarter  
(NE/4) of Section 27, Township 12 North,  
Range 17, W.I.M., Custer County,  
Oklahoma, being described by metes and  
bounds as follows: Beginning at a point  
1055.55 feet South and 545.88 feet West  
of the Northeast corner of said Northeast  
Quarter (NE/4) of Section 27; thence  
South 6° 07' 40" West a distance of  
248.18 feet; thence North 83° 52' 20"  
West a distance of 160.0 feet; thence  
North 6° 07' 40" East along the Easterly  
right-of-way line of the S.L. & S.F.  
Railroad a distance of 231.0 feet; thence  
East 160.92 feet to the point of  
beginning, containing 0.8800 acre; and

A tract of land in the Northeast Quarter  
of Section 27, Township 12 North, Range  
17, W.I.M., Custer County, Oklahoma,  
described by metes and bounds as follows:  
Beginning at a point 789.44 feet North  
and 633.82 feet West of the Southeast  
corner of said Northeast Quarter of  
Section 27, said point being on the North  
right-of-way line of Industrial  
Boulevard, Clinton, Oklahoma; thence  
North 81° 35' West along said North  
right-of-way line a distance of 160.13  
feet to the East right-of-way line of the  
S.L. & S.F. Railroad, thence North 6° 07'  
40" East along said East right-of-way  
line a distance of 541.30 feet; thence  
South 83° 52' 20" East a distance of  
160.00 feet; thence South 6° 07' 40" West  
a distance of 547.70 feet to the point of  
beginning, containing 2.00 acres.

together with all and singular the hereditaments and appur-  
tenances thereunto belonging.

[1]

OCT 19 1987 at 8:15 a.m.  
State of Oklahoma, Custer County, ss. Filed  
Recorded in Book 337 Page 435-437 Evelyn Reed, County Clerk  
Gracie Coyne Hupenthal By Diana O. Dagg Deputy



TO HAVE AND TO HOLD the above described premises unto the said second party, its heirs and assigns forever, so that neither the said parties of the first part, nor any person in their name and behalf, shall or will hereafter claim or demand any right or title to the said premises or any part thereof; but they and everyone of them shall by these presents be excluded and forever barred.

IN WITNESS WHEREOF, the said parties of the first part have hereunto set their hands the day and year first above written.



ATTEST:  
*[Signature]*  
Its Secretary

(SEAL)

*[Signature]*  
RAY WICHERT

*[Signature]*  
PEGGY JO WICHERT

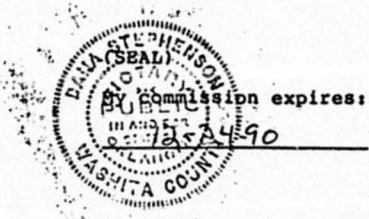
WICHERT, INC., a corporation,  
By *[Signature]*  
Its President

State of Oklahoma,  
County of Washita, 188

Before me, the undersigned, a Notary Public in and for said County and State on this 12<sup>th</sup> day of October, 1987, personally appeared Ray Wichert and Peggy Jo Wichert, his wife, to me known to be the identical persons who executed the within and foregoing instrument and acknowledged to me that they executed the same as their free and voluntary act and deed for the uses and purposes therein set forth.

Given under my hand and seal the day and year last above written.

*[Signature]*  
Notary Public



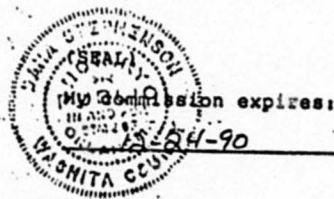


State of Oklahoma,  
County of Washita,

Before me, the undersigned, a Notary Public, in and for  
said County and State on this 12<sup>th</sup> day of October, 1987,  
personally appeared Ray Wichert, to me  
known to be the identical person who subscribed the name of  
the maker thereof to the foregoing instrument as its  
President and acknowledged to me that he executed the same  
as his free and voluntary act and deed and as the free and  
voluntary act and deed of such corporation, for the uses and  
purposes therein set forth.

Given under my hand and seal the day and year last above  
written.

Dana Stephenson  
Notary Public





# DARRELL MCCARTHER CERTIFICATE OF SURVEY

I, Darrell McCarther, a Registered Land Surveyor of the State of Oklahoma, hereby certify that I have made a careful survey of a tract of land described hereon below and that all the information shown on the plat hereon below is true and correct and is strictly according to the field notes of said survey.

Signed and sealed this 5 day of February, 19 91

Darrell McCarther  
Registered Professional Land Surveyor

Subscribed and sworn to before me the undersigned, a Notary Public in and for the State of Oklahoma, this 5 day of Feb, February, 19 91

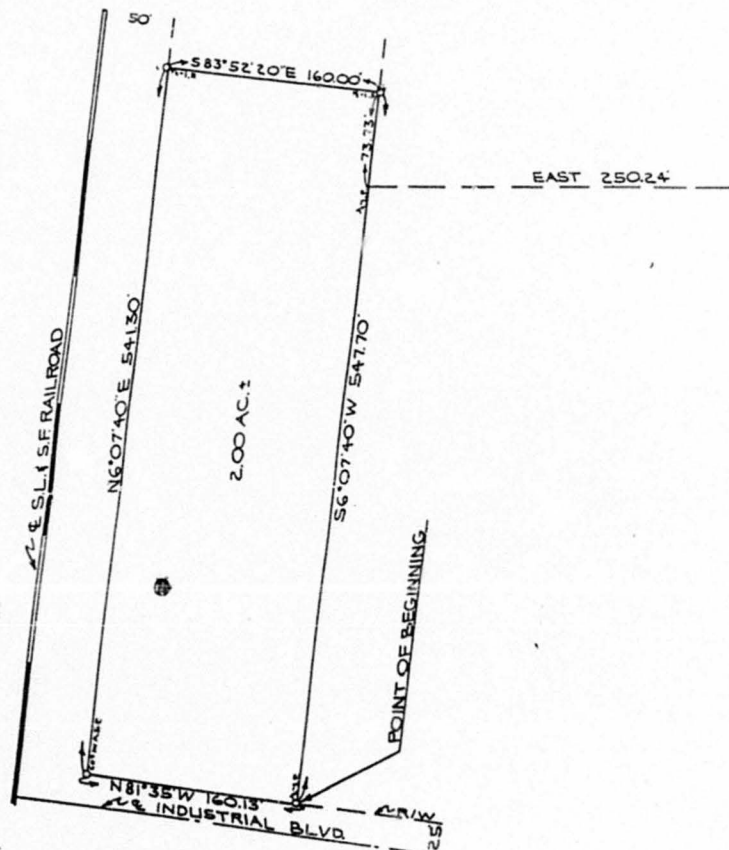
My commission expires: 3-17-93

Carol M. Carver

Notary Public

## LEGAL DESCRIPTION OF LAND SURVEYED

A tract of land in the Northeast Quarter of Section 27, Township 12 North, Range 17 West of the Indian Meridian, Custer County, Oklahoma, described by metes and bounds as follows: Beginning at a point 780.44 feet North and 633.82 feet West of the Southeast Corner of said Northeast Quarter of Section 27, said point being on the North right-of-way line of Industrial Boulevard, Clinton, Oklahoma; thence N 81°35'W along said North right-of-way line a distance of 160.13 feet to the East right-of-way line of the S.L. & S.E. Railroad; thence N 6°07'40"E along said East right-of-way line a distance of 541.30 feet; thence S 83°55'20"E a distance of 160.00 feet; thence S 6°07'40"W a distance of 547.70 feet to the point of beginning, containing 2.00 acres more or less.



wichent  
info.

J.

Source: From Robert L. Craig, Director Radiation Protection Division  
4/23/86

- the property has been used "in the past" as a disposal site for concrete, asphalt, and construction sites in the City of Clinton
- The drainage of surface water is to the north toward the intermittent water course.
- The property was surveyed for radiation. There were spots in the area where radiation levels were found to be in excess of 10 times the background. These high levels were found in the vicinity of some piles of debris and in the area over which drainage from the piles would have passed.  
(see attached copy of results and sample locations)

K  
wichent  
info.

Source: memo from Robert L. Craig, Director Radiation Protection Division

- from report of concentrations of radium found on wichent property (4/23/92), Robert Craig, Director of Radiation Protection Division, says action must be taken to remove the radium contaminated soil. He lists 5 alternatives + their estimated cost.

Did not  
use yes  
5/20/92

MEMORANDUM  
April 23, 1986

TO: Dale McHard, Chief *DMC*  
Radiation and Special Hazards Service

FROM: Robert L. Craig, Director *RLC*  
Radiation Protection Division

SUBJECT: Radium Contamination on Ray Wichert Property in Clinton, Oklahoma

On April 15, 1986 I took soil samples on the subject property for the purpose of evaluating the degree of radium contamination. I was accompanied by Terry Thiesson and Bob Giger, Custer County sanitarians. Mr. Wichert was not available to accompany us.

The property is on the south side of Clinton and lies just east of U.S. Highway 83 (map attached). On the west side of the property is a railroad track. On the east side is an intermittent water course which drains to the north. On the south side is a car wash. The level of the property is about six feet below the level of the adjoining property.

The property has been used in the past as a disposal site for concrete, asphalt, and dirt from construction sites in the City of Clinton. This debris is in piles up to three feet high which are fairly evenly distributed over the property. The large pieces of concrete and other construction debris prevented easy access to parts of the site. The drainage of surface water is to the north toward the intermittent water course. The soil is thin, estimated to one or two inches above the underlying sandstone.

The property was surveyed with the 1 X 1 inch NaI detector and the background radiation was found to be about 10 microroentgen per hour (micro R/hr) which is normal for that area in Oklahoma. There were spots in the area where the radiation levels were found to be in excess of 100 micro R/hr. These levels were found in the vicinity of some piles of debris and in the area over which drainage from the piles would have passed.

A rough sketch of the area is attached. The piles of debris near which elevated external gamma radiation levels were found are identified as A, B, C, D, F, and G. The drainage area which was sampled is identified as E.

Samples were taken with a 3/4 inch diameter core sampler which was 8 inches long. At the location where it was possible to obtain an 8 inch core, the samples were divided into two portions, surface to four inches depth and four to eight inches depth, which were analyzed separately. For purposes of comparison a similar sample was collected from the lawn of the State Health Department.

Memorandum  
April 23, 1986  
Page 2

The results of the analyses were:

<u>Sample Point</u>	<u>Depth (inches)</u>	<u>Radium (p Ci/gm)</u>
A	0-4	23
A	4-8	33
B	0-4	49
B	4-8	163
C	0-4	27
D	0-4	149
E	0-1	113
F	0-4	37
F	4-8	67
G	0-4	63
OSDH	0-4	< 4
Shield Background	--	< 4

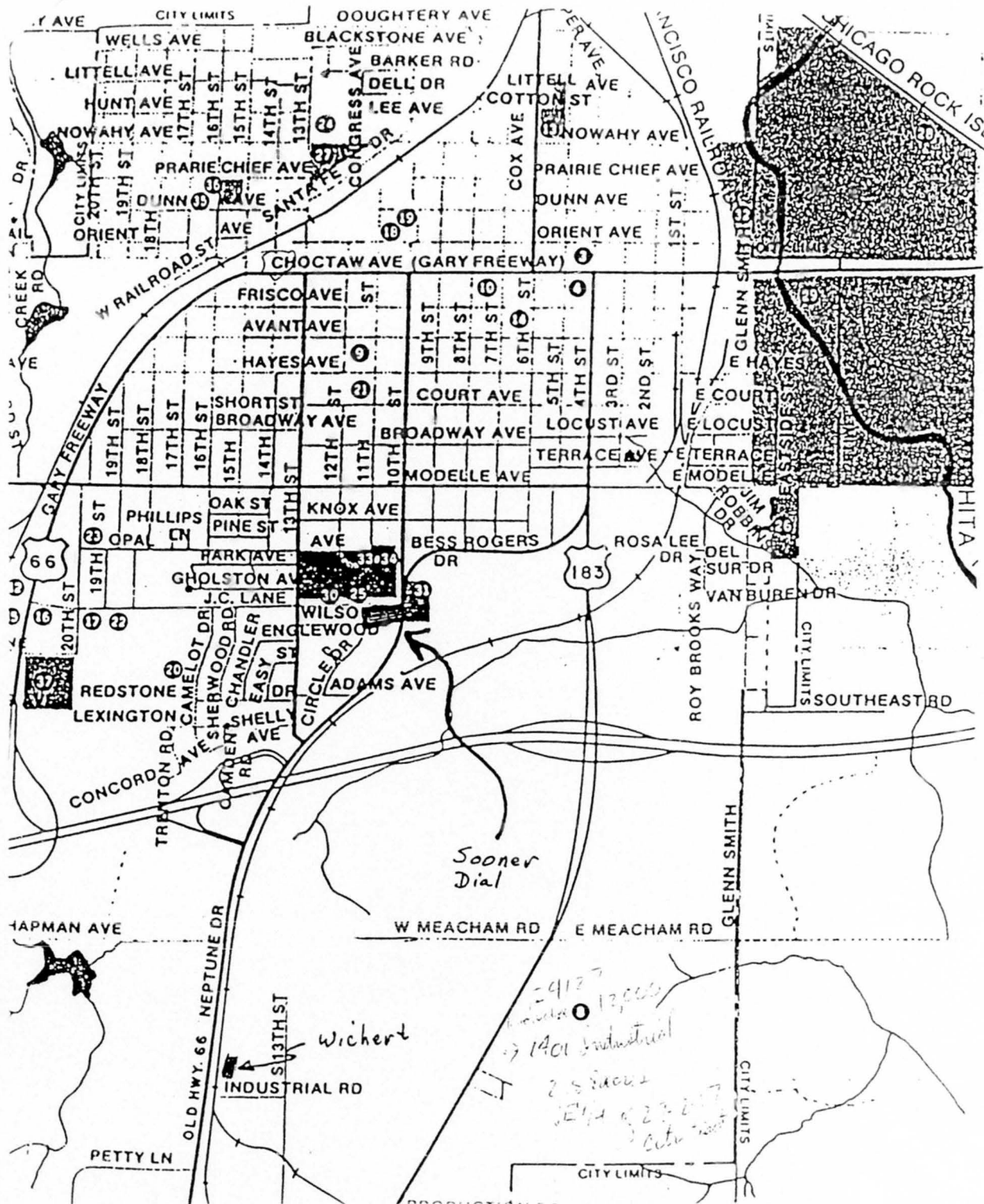
Minimum Detectable Concentrations - 4 pCi/gm

Attachments

cc: Terry Thiesson

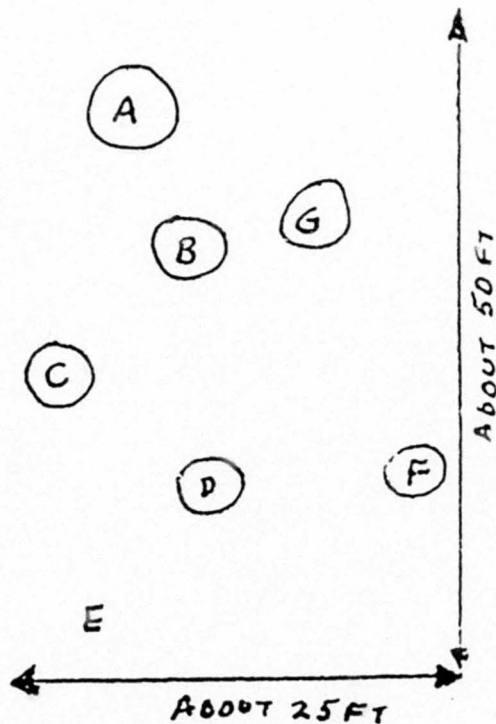
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Source J.

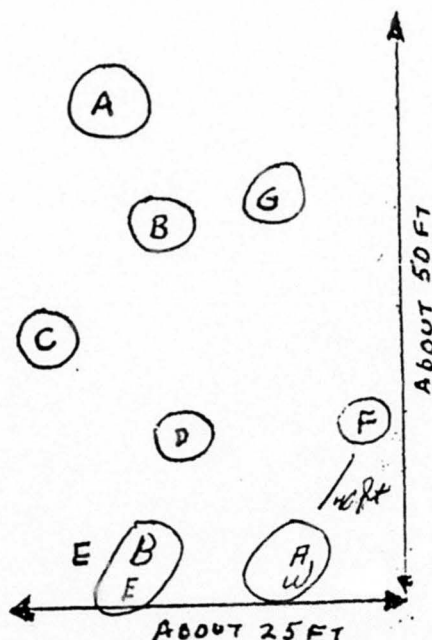
Wichert Property  
Clinton, OK

Sample Collection Points

15-APR-86

RCC





Samples taken on  
4-13-86 and  
is mentioned in  
4/23/86 memo from  
Robert Craig to  
Dale McHard

RECEIVED  
APR 30 1986

Radiation & Special  
Hazards Service

Wichert Property  
Clinton, OK

Sample Collection Points

15-APR-86

R & C

of I picked up these two samples before the drop off at back  
of the lot roughly 40 feet NE from point F  
W & B E sites are about 15 feet apart

Terry D. Thuermer

June 24, 1992

FILE COPY

MEMORANDUM

To: H. A. Caves, Chief  
Consumer Protection Service

From: Jimmy D. Givens *JAG*

Re: Phone Conversation with Mark Schwartz

I spoke by phone today with Mark Schwartz, attorney for Ron Grubb. We discussed four items:

1. Apparently the enclosure to my May 6, 1992 letter (staff comments on Techrad's proposed site characterization plan) was inadvertently omitted when the letter was mailed. I am sending Schwartz a replacement copy tomorrow.

2. Edo Air has agreed to meet with Schwartz when he is in New York on other business July 13-15.

3. Grubb confirms that he had the Sooner Dial building torn down after he acquired the property. However, he claims that he hired Sugar Creek Transport, owned by Bill Warner, to haul the rubble off, and that it was Warner who chose to take it to the "rubble site". According to Grubb, the "rubble site" was owned by Earl Smith, who openly allowed people to dump dirt, etc. there.

4. Schwartz is going to Clinton to see the site next Tuesday. I may accompany him. Please advise if you have any interest in going.

cc: Scott Thompson.

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Memorandum  
March 15, 1985

To: Mark S. Coleman, Deputy Commissioner  
for Environmental Health Services

Thru: Dale McHard, Chief *DM*  
Radiation and Special Hazards Service

From: Robert L. Craig, Director *RLC*  
Radiation Protection Division

Subject: Project Summary, Sooner Dial Company Site, Clinton

On January 24, 1985 a cursory survey of the site was made by Truby and Smith and two samples of soil were taken. Radiation levels were measured but were not recorded. The gamma ray levels ranged from 10,000 cpm on the Ludlum 1 X 1 inch NaI scintillation detector (about 0.01 mr/hr.) to 20 mR/hr as measured with a GM type survey instrument. The concentration of radium in the soil samples was 1130 and 1040 pCi/gm.

On the basis of these results, the owner (Mr. Ron Grubbs) was contacted and informed that there was radium contamination on the property.

On February 11, 1985 a more detailed survey of the property was made by Craig and Thiesson (Custer County Sanitarian). At this time, a grid was established on the property and external gamma ray measurements were made and recorded at ground level and three feet above the ground. The grid was about 30 feet on each side (900 sq. ft. for each grid section). Samples were collected at three locations on the property. Samples were taken at two inch intervals from the ground surface to the underlying sandstone. The warehouse was also surveyed for external radiation levels and for alpha radioactivity contamination.

The gamma ray levels in the warehouse were found to be at background levels (10,000 cpm on the NaI detector).

A swipe sample of the floor of the warehouse indicated that there was no removable alpha contamination. Direct survey of the floor indicated levels of fixed contamination ranging from 1400 to 2600 dpm per 100 square centimeters.

Analysis of the soil samples showed the following results:

<u>Date Sampled</u>	<u>Location*</u>	<u>Depth Below Ground Surface</u>	<u>Radium (pCi/gm)</u>
24 Jan 85	X	Surface	1,130
24 Jan 85	X	Surface	1,140
11 Feb 85	1-A	0 to 2 in.	2,130
	1-B	2 to 4 in.	580
	1-C	4 to 6 in.	810
11 Feb 85	2-A	0 to 2 in.	150
	2-B	2 to 4 in.	880
11 Feb 85	3-A	0 to 2 in.	130
	3-B	2 to 4 in.	210
	3-C	4 to 6 in.	200

\*See sketch

The gamma ray measurements shown on the sketch and the concentrations shown above indicate the presence of widely spread, non-uniform contamination on the site. There are several spots where the external radiation levels indicate high levels of contamination in the soil and two hot spots under the concrete apron at the rear of the warehouse. These are also indications that there may be contamination of the soil across the alley from the site.

Analysis of one of the samples collected on January 24, 1985 indicates that less than 0.5 percent of the radium is soluble.

Some rubble had been removed from the site and hauled to a site inside the city limits of Clinton to be used as construction fill. Thiesson knows the location of this site. The site is owned by Ray Wickert, Inc., 1401 Industrial Road, Clinton, Oklahoma. The site is reported to be 2 or 3 acres in area and the fill is 6 to 8 feet deep.

There is contamination on the floor of the warehouse which is minimal. The levels are in the range which require remedial action.

Present knowledge indicates that there is uncontrolled radium contamination in the soil on the site in concentrations which require removal. A preliminary estimate indicates that the cost of removal may exceed \$500,000. There is a good possibility that this cost may be reduced significantly if more detailed survey and analysis information were available. Since the radium is only very slightly soluble, there should not be any significant contamination of other groups of water. The degree of hazard to the public is a function of the radium while the radium must be removed, care must be taken in the design of the remedial action plan.

RECEIVED  
JUL 25 1990  
ENVIRONMENTAL  
HEALTH SERVICES

MEMORANDUM

June 29, 1990

TO: H. A. Caves, Chief  
Consumer Protection Service

FROM: Paul H. Brown, Director *PHB*  
Radiation Protection Division

SUBJECT: Radiation Survey of Sooner Dial

On April 24, 1990, Gary Ammon and I traveled to Clinton for the purpose of conducting a radiation survey of the building, land, and rubble which was associated with the Sooner Dial Facility. The present land owner, Ron Grubb, was contacted (405-323-6400), and we received his permission to survey the site. We were also assisted by our local sanitarian, Terry Thiesson.

Areas surveyed were the original site, which consists of a vacant lot and auto shop located at 1000-1004 10th Street, the adjacent alley, and surrounding property (see attached map). In addition, building rubble had been removed and transported to a dumping area approximately two (2) miles southeast of the site. This dump area is an isolated field in which fill material had been requested. No further development of this area is now planned.

A radiation survey was performed at all locations utilizing a Ludlum Micro-R Meter. Gamma readings in excess of 50 micro-R per hour (approximately 7 to 8 times background) were noted and those areas delineated on the map. In addition, soil samples were taken for further analysis. Sample numbers and locations are also noted on the accompanying map.

Procedure for Analyzing Soil Samples

The radium-226 in soil samples were analyzed by Mark Kurklin of the radiochemistry laboratory in June 1990. They were first air dried and then crushed to a granular consistency. (They were not ground with a mortar and pestle.) Each sample was mixed well and a 25 gram aliquot of the soil was weighed into a plastic bottle that was used as the configuration for calibration. A known radium-226 standard was prepared using 25 grams of low background soil in the same plastic bottle configuration.

A gamma spectrum of each sample, the standard, and a blank was collected for 30 minutes on a Canberra Series 90 Multichannel Analyzer. The area under the radium-226, 186.1 KeV energy peak was determined using the gamma spectrum analysis computer software provided by Canberra Industries. The radio-activity due to radium-226 in each of the samples was calculated as proportional to the number of counts under the 186.1 KeV energy peak of the known standard. There was no apparent interference from uranium-235 which has a gamma peak at 185.7 KeV.

#### Regulatory Limits

Section 14, Table 3, Column 2 of the Oklahoma Radiation Protection Regulations indicates a release limit for insoluble Ra-226 in water as  $3 \times 10^{-5}$  microCuries/ml (30 pico Curie/ml). No specific table exists for soil contamination. However, it is an acceptable practice to convert this table to soil contamination limits by substituting the pCi/ml to pCi/gram. Therefore, the soil contamination limit should be 30 pCi/gram. (Further rationale to support this assumption can be obtained from Dale McHard).

The survey results and observations for each locale follow:

#### Dump Site

Again, this is a very isolated area containing numerous piles of building rubble. Gamma surveys were conducted, and three areas with elevated readings were staked, and soil samples collected. The results follow:

<u>Area</u>	<u>Gamma Reading</u>	<u>Soil Depth</u>	<u>Activity/gram</u>
1	350 Micro R/hr	0 - 6 In	385 pCi
2	250 Micro R/hr	0 - 6 In	18 pCi
3	200 Micro R/hr	0 - 6 In	226 pCi

This area does contain building rubble with residual radium in concentrations of concern. Due to its isolated location, at this time I would not recommend any removal. However, the area must be observed for any future development plans.

#### Auto Shop

Gamma surveys indicated three areas on the floor with measurable readings. However, these areas had been painted and marked. Swipe tests indicated no removal contamination. I consider the floor to be acceptable and no further remedial action is needed.

#### Vacant Lot

A building formerly located at the rear of the auto body shop had been removed in late 1984, and the rubble transported to the dump area previously mentioned. There appears to be concrete in areas of the lot 4 - 6 inches below the surface. The following sample locations (noted on the map) and readings are associated with this lot and the adjacent areas:



6. The surveyors (Smith & Truby) believe, due to sample data,

that the north building will contain residual quantities of radium. And that the south building may be free of any radioactive materials. However close monitoring will be required.

- The surveyors (Smith & Truby) believe, due to sample data, that the north building will contain residual quantities of radium. And that the south building may be free of any radioactive materials. However close monitoring will be required.
- The removed building rubble "will contain" residual radium and <sup>believed to be</sup> is disposed of at the Raymond Wichert property.

**H** Source: memo <sup>6/29/90</sup> from Paul H. Brown <sup>Director</sup> Radiation Protection Div.  
(radiation survey conducted on 4/24/90)

- radiation survey of the site indicated Gamma readings 7 to 8 times background

**I** Source: JSD: letter to Ray Wichert (report concerning sample 8 taken on Wichert property)

- Terry Thriesson, Custer County Sanitarian, collected two soil samples where run off water flows over the bank of the creek. These samples had 100 and 48 picocuries of radium per gram respectively. "Thus this contaminated soil must be removed".

Wichert info.

Joan K. Leavitt, M.D.  
Commissioner

OKLAHOMA STATE  
DEPARTMENT OF HEALTH

P.O. BOX 53551  
1000 NE TENTH  
OKLAHOMA CITY, OK 73152



AN EQUAL OPPORTUNITY EMPLOYER

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Burdge F. Green, M.D.  
Linda M. Johnson, M.D.  
Lee W. Paden

September 24, 1990

Oklahoma Bank and Trust Company  
Box 99  
Clinton, Oklahoma 73601

To Whom It May Concern:

The Oklahoma State Department of Health ( "Department" ) has reason to believe that as a result of radium contaminated building rubble disposed of upon the unimproved part of your property at 1401 Industrial Road in Clinton, the property may pose a potential threat to the public health. This belief is based upon the results of preliminary site surveys conducted most recently on April 24, 1990 and prior to that on April 15, 1986, and on January 24, 1985. In each instance low-level ionizing radiation was detected at levels that may exceed recommended good radiation safety practices.

The Department has identified several avenues to address the investigation and any necessary remediation of this site to reduce the radiation hazard which it may pose.

The preferred option is that you voluntarily agree to conduct a detailed site characterization of your property to assess the extent and severity of the uncontrolled radium contaminated rubble and soil, with subsequent removal to the extent necessary. Enclosed are proposed criteria for the detailed characterization of the property. Both the final work plan and the timetable for the completion of events are subject to prior approval by the state before implementation. The Department requests that you send a written response expressing your intentions within 20 days of your receipt of this letter. Your agreement to pursue an approved course of action for the investigation and remediation of this site will render enforcement action by the State unnecessary.

Upon receipt of a negative response or a refusal to elect to investigate/remediate the potentially hazardous site owned by you, it will be necessary for the State to consider enforcement action for the abatement of a public nuisance and/or for violations of the Department of Health Radiation Protection Regulations. Such action could result in the assessment of fines and/or costs charged as a lien upon the property.

In pursuing alternatives, the Department has also made inquiry to the EPA Region VI office for determining whether the site can be characterized as a hazardous waste site under the Comprehensive Environmental Response, Compensation, and Liability Act ( CERCLA ).

FILE COPY

July 31, 1991

MEMORANDUM

To: H. A. Caves  
From: Jimmy Givens *Q518*  
Re: Sooner Dial Rubble Site

I received a call today from Al Wood, Vice-President of Oklahoma Bank and Trust in Clinton. In essence, he argued that he had not seen any evidence that the rubble site might be contaminated. He says that the bank should not be in the position of having to spend money for an assessment without something more than speculation as to possible contamination. I told him that my recollection was that at least some field measurements had been made in the past. I told him I would provide any information we have on those to him so he can make a more informed judgment whether to pursue their own assessment, or take their chances with an EPA assessment and possible subsequent enforcement or cost recovery action.

Please have Dale or another appropriate person gather whatever information we have on contamination readings for the rubble site so I can forward them to the bank. I will give them a short response time. In the meantime, I suggest that we go ahead and set up a meeting with Scott Thompson to begin planning for a referral to EPA because I get the feeling that the bank is not going to do anything.

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REFERENCE 5

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**Dangerous  
Properties  
of**

**Industrial  
Materials**

Sixth Edition

**N. Irving Sax**

mass and may or may not be electrically charged, i.e., alpha (positive) and beta (negative); also neutrons. Beams of such particles may be considered as "rays." The charged particles may all be accelerated and high energy imparted to "beams" in particle accelerators such as cyclotrons, betatrons, synchrotrons and linear accelerators.

Type of radiation	Wavelength Å
cosmic .....	0.0005-0.005
gamma .....	0.005-1.4
X .....	0.1-100
UV .....	100-4000
visible .....	4000-7000
infrared .....	7000-2,000,000

**Radiation, ionizing:** Extremely short-wavelength, highly energetic penetrating rays of the following types: (a) gamma rays emitted by radioactive elements and radioisotopes (decay of atomic nucleus); (b) x-rays, generated by sudden stoppage of fast-moving electrons; (c) subatomic charged particles (electrons, protons, deuterons) when accelerated in a cyclotron or betatron. The term is restricted to electromagnetic radiation at least as energetic as x-rays, and to charged particles of similar energies. Neutrons also may induce ionization.

Such radiation is strong enough to remove electrons from any atoms in its path, leading to the formation of free radicals. These short-lived but highly reactive particles initiate decomposition of many organic compounds. Thus ionizing radiation can cause mutations in DNA and in cell nuclei; adversely affect protein and amino acid mechanisms; impair or destroy body tissue; and attack bone marrow, the source of red blood cells. Exposure to ionizing radiation for even a short period is highly dangerous, and for an extended period may be lethal. The study of the chemical effects of such radiation is called radiation chemistry or (in the case of body reactions) radiation biochemistry.

## RADIUM

af: Ra; aw: 226

A radioactive earth metal. Brilliant white, tarnishes in air. Decomp in water; mp: 700°; bp: 1737°; d: 5.5.

**THR:** Common air contaminant. A highly radiotoxic element. 1 g =  $3.7 \times 10^{10}$  dps. Inhal, ingestion or bodily exposure to Ra can lead to lung cancer, bone cancer, osteitis, skin damage and blood dyscrasias.

Ra replaces calcium in the bone structure and is a source of irradiation to the blood forming organs. The ingestion of luminous dial paint prepared from radium was the cause of death of many of the early dial painters before the hazard was fully understood. The data on these workers has been the source of many of the radiation precautions and the maximum permissible levels for internal emitters which are now accepted. <sup>226</sup>Ra

is the parent of radon and the precautions described under <sup>222</sup>Rn should be followed.

<sup>226</sup>Ra is a member of the thorium series. It was a common constituent of luminous paints, and while its low beta energy was not a hazard, its daughters in the series may have been a causative agent in the deaths of the radium dial painters following World War I. Its metabolism is the same as any other radium isotope and it is a source of thoron. The precautions recommended under <sup>220</sup>Rn should be followed.

**Disaster Hazard:** Highly dangerous; must be kept heavily shielded and stored away from possible dissemination by explosion, flood, etc.

**Radiation Hazard:** Natural isotope <sup>223</sup>Ra (Actinium-X, Actinium Series),  $T_{1/2} = 11.4$  D, decays to radioactive <sup>219</sup>Rn via alphas of 5.5-5.7 MeV. Natural isotope <sup>224</sup>Ra (Thorium-X, Thorium Series),  $T_{1/2} = 3.6$  D, decays to radioactive <sup>220</sup>Rn via alphas of 5.7 MeV. Natural isotope <sup>226</sup>Ra (Uranium Series),  $T_{1/2} = 1600$  y, decays to radioactive <sup>222</sup>Rn via alphas of 4.8 MeV. Natural isotope <sup>228</sup>Ra (Mesothorium = 1, Thorium Series),  $T_{1/2} = 6.7$  y, decays to radioactive <sup>228</sup>Ac via betas of 0.05 MeV.

## RADON

mf: Rn; mw: 86

Colorless, odorless, inert gas, very dense. bp: -62°; d (gas @ 1 atm and 0°): 9.73 g/L, (liq @ bp): 4.4.

**THR:** A common air contaminant.

**Radiation Hazard:** Natural isotope <sup>220</sup>Rn (Thoron, Thorium Series),  $T_{1/2} = 55$  s, decays to radioactive <sup>216</sup>Po via alphas of 6.3 MeV. Natural isotope <sup>222</sup>Rn (Uranium Series),  $T_{1/2} = 3.8$  d, decays to radioactive <sup>218</sup>Po via alphas of 5.5 MeV. The permissible levels are given for <sup>222</sup>Rn in equilibrium with its daughters. The chief hazard from this isotope is inhal of the gaseous element and its solid daughters, which are collected on the normal dust of the air. This material is deposited in the lungs and has been considered to be a major causative agent in the high incidence of lung cancer found in uranium miners. Radon and its daughters build up to an equilibrium value in about a month from radium compounds, while the build-up from uranium compounds is negligible. Good ventilation of areas where radium is handled or stored is recommended to prevent accumulation of hazardous conc of Rn and its daughters.

## RAISNOMYCIN

CAS RN: 1393040

NIOSH #: VE 4725000

Produced by *Streptomyces kentuckensis* (ANTCAO 6,286,56)

### TOXICITY DATA:

3

### CODEN:

unk-rat LDLo: 28 mg/kg  
unk-mus LD50: 28 mg/kg

ANTCAO 6,286,56  
85ERAY 1,267,78

**THR:** HIGH unk.

**Disaster Hazard:** When heated to decomp it emits acrid smoke and fumes.



REFERENCE 6

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SOIL SURVEY OF

# Custer County, Oklahoma

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United States Department of Agriculture  
Soil Conservation Service

In cooperation with  
Oklahoma Agricultural Experiment Station

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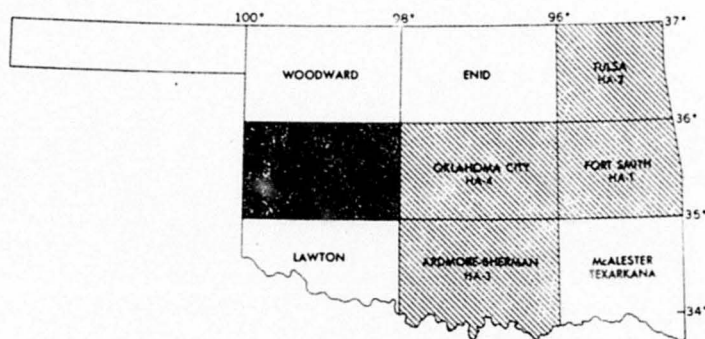
## OKLAHOMA GEOLOGICAL SURVEY

Charles J. Mankin, *Director*

## HYDROLOGIC ATLAS 5

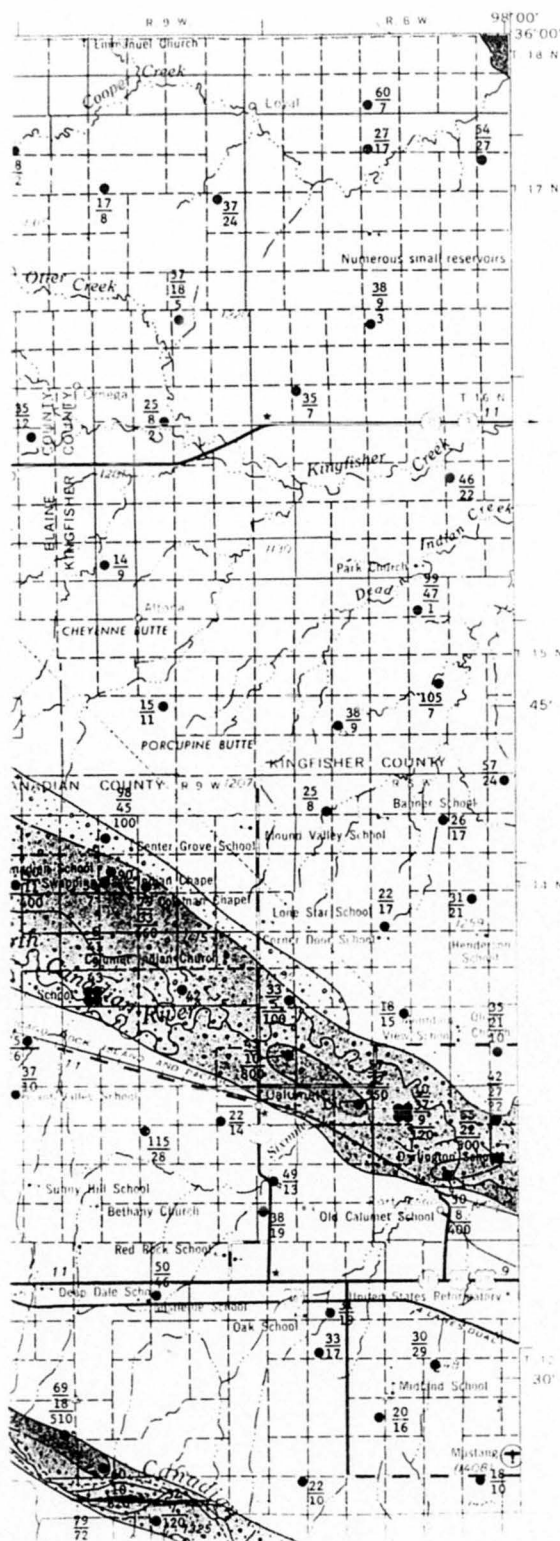
RECONNAISSANCE OF THE WATER RESOURCES OF THE CLINTON QUADRANGLE  
WEST-CENTRAL OKLAHOMA

By

JERRY E. CARR and DEROY L. BERGMAN  
U.S. Geological SurveyPrepared in cooperation with  
UNITED STATES GEOLOGICAL SURVEY

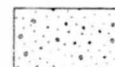
Scale 1:250,000

The University of Oklahoma  
Norman  
1976



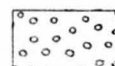
# EXPLANATION

## MAJOR AQUIFERS



### Alluvium and terrace deposits

Along large streams, deposits consist of clay and silt at the surface, grading downward into coarse sand and gravel at the base. Water is available from saturated layers of sand and gravel, and yields are highest where the coarse sand and gravel layers are thickest. In areas where an alluvium or terrace aquifer overlies the Rush Springs Sandstone, water is available from either aquifer.



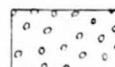
### Ogallala Formation

Semiconsolidated layers of fine to medium sand, clay, silt, and gravel. Average thickness is probably about 100 feet.



### Elk City Sandstone

Mainly fine-grained sandstone with minor amounts of silt and clay. Maximum thickness is about 185 feet; formation thins toward the edges.



### Rush Springs Sandstone and Marlow Formation

The Rush Springs Sandstone, which has a maximum thickness of about 300 feet, consists mainly of fine-grained sandstone with some dolomite, shale, and gypsum beds. The Marlow Formation has a maximum thickness of about 100 feet and consists of fine-grained sandstone with much gypsum and shale.



### Blaine Formation

Mainly shale, interbedded with gypsum and dolomite. Maximum thickness is about 200 feet. Water is available from erratically occurring solution channels in the gypsum.

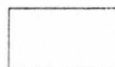
## YIELD OF MAJOR AQUIFERS, RANGE IN GALLONS PER MINUTE



More than 300



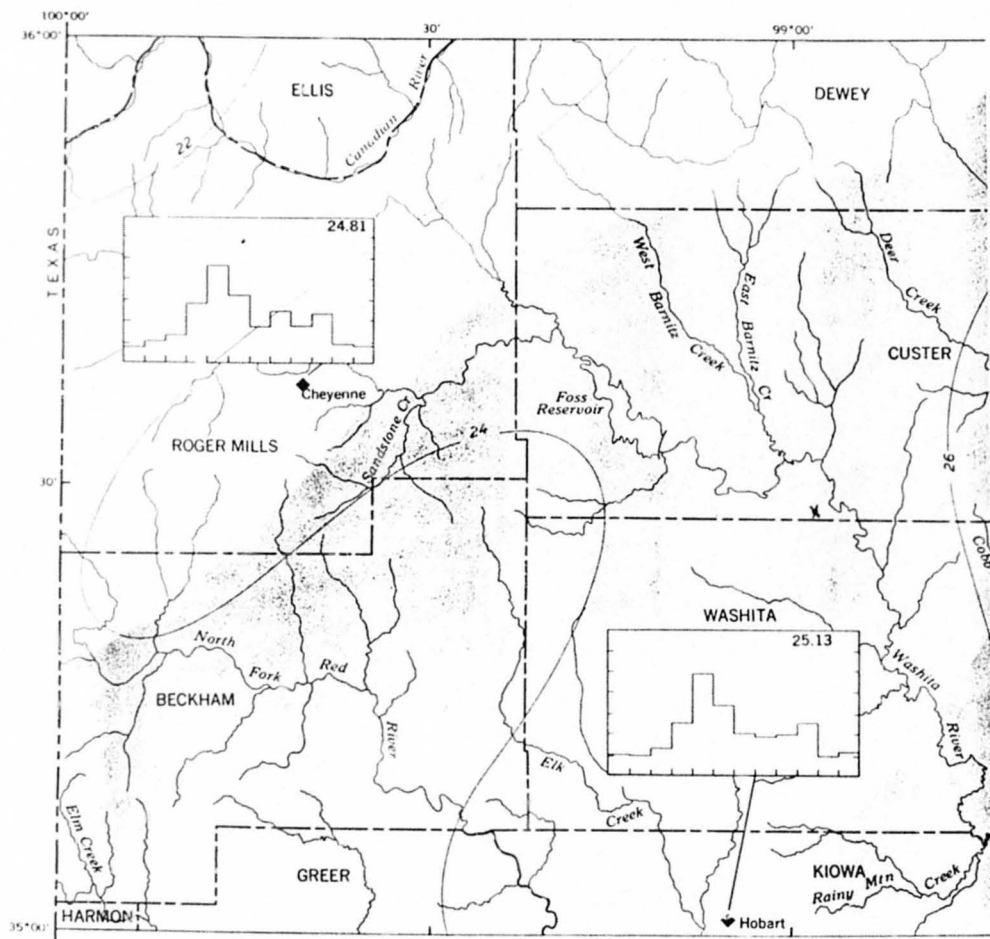
150 to 300



25 to 150

## YIELD OF REMAINING AREAS, IN GALLONS PER MINUTE

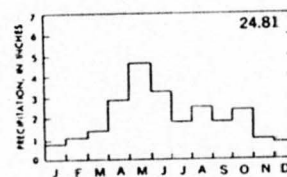
# OKLAHOMA GEOLOGICAL SURVEY



## EXPLANATION

(Precipitation data from the National Oceanic and Atmospheric Administration)

Line of equal mean annual precipitation, in inches, based on normal annual precipitation, 1931-60

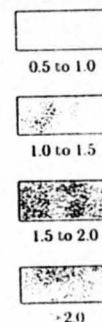


Graph of normal monthly precipitation

Figure in upper right of graph is normal annual precipitation, in inches

◆ Cheyenne  
Weather station

Average yearly runoff, in inches

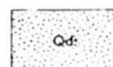


SCALE 1:750,000



# EXPLANATION

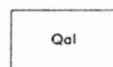
The stratigraphic nomenclature and age determinations used herein are those accepted by the Oklahoma Geological Survey and do not necessarily agree with those of the U.S. Geological Survey.



Qd

DUNE SAND

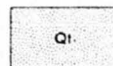
Wind-blown sand; thickness ranges from a thin veneer to about 70 feet.



Qal

ALLUVIUM

Stream-laid deposits of sand, silt, clay, and gravel; thickness ranges from 0 to about 170 feet.

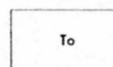


Qt

TERRACE DEPOSITS

Stream-laid deposits of sand, silt, clay, gravel, and volcanic ash; thickness ranges from 0 to about 120 feet.

UNCONFORMITY

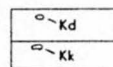


To

OGALLALA FORMATION

Gray to light-brown, fine- to medium-grained sand with some clay, silt, gravel, volcanic ash, and caliche beds; locally cemented by calcium carbonate. Thickness ranges from 0 to about 320 feet. The formation thins eastward.

UNCONFORMITY

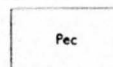


Kd  
Kk

KIOWA FORMATION and DAKOTA GROUP

Outliers of the *Kiowa Formation*, Kk, dark-gray shale with some thin beds of fossiliferous tan limestone, range in thickness from a few feet to about 20 feet. Associated in some places is a 5- to 10-foot, gray to brown, coarse-grained sandstone and conglomerate assigned to the overlying *Dakota Group*, Kd (lower sandstone part). Several hundred outliers occur (generally too small to show on map) west of U.S. Highway 183, resting on units ranging from the Rush Springs Formation to the Elk City Sandstone.

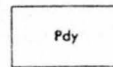
UNCONFORMITY



Pec

ELK CITY SANDSTONE

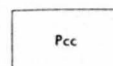
Reddish-brown, fine-grained sandstone with minor amounts of silt and clay, weakly cemented by iron oxide, calcium carbonate, and gypsum; maximum thickness 185 feet, top eroded.



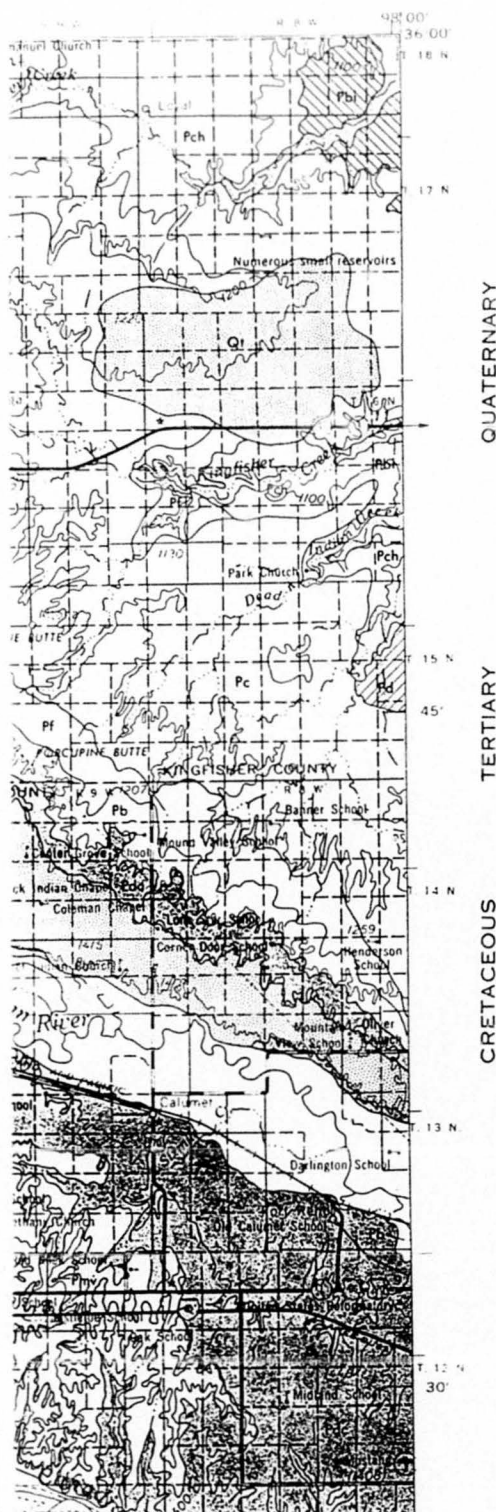
Pdy

DOXEY SHALE

Reddish-brown, silty shale and siltstone; thickness, about 190 feet.



Pcc



QUATERNARY

TERTIARY

CRETACEOUS

Comanche



R 8 W  
F 4, Oklahoma Geological Survey, 1975

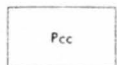
Custerian

PERMIAN

Cimarronian

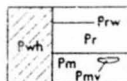
#### DOXEY SHALE

Reddish-brown, silty shale and siltstone; thickness, about 190 feet.



#### CLOUD CHIEF FORMATION

Reddish-brown to orange-brown shale, interbedded with siltstone and sandstone in the middle part and some dolomite and much gypsum in lower part; thickness about 400 feet, thinning northward to about 175 feet. The *Moccasin Creek Gypsum Member* is at the base.

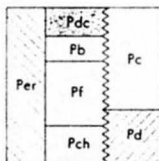


#### WHITEHORSE GROUP

Predominantly orange-brown, fine-grained sandstone, the *Whitehorse Group* is mapped as Pwh where separate formations have not been distinguished and as the *Rush Springs Formation* and the *Marlow Formation* where identified.

*Rush Springs Formation*, Pr, orange-brown, cross-bedded, fine-grained sandstone with some dolomite and gypsum beds. Thickness, about 300 feet, thinning northward to about 186 feet. The *Weatherford Gypsum Bed*, Prw, is about 30 to 60 feet below the top (mapped in southeastern part only).

*Marlow Formation*, Pm, orange-brown, fine-grained sandstone and siltstone, about 100 to 130 feet thick, thinning northward. This formation has 2 gypsum and (or) dolomite beds in upper 20 feet—the *Emanuel Bed* (at top) and the *Relay Creek Bed* (20 feet below top). Two thin, pink shales occur; the first is 1 foot below the top (*Gracemont*) and the second is 55 feet above the base (unnamed). The *Verden Sandstone Lenticle*, Pmv, is a coarse-grained, calcareous, fossiliferous sandstone (2 to 10 feet thick) that occurs in the middle of the Marlow, about 25 feet below the Relay Creek Bed and 85 to 95 feet above the base.



#### EL RENO GROUP

Primarily evaporites and reddish-brown shale, with deltaic clastics to the southeast. Where separate formations have not been distinguished, the *El Reno Group* is mapped as Per; the formations listed below have been distinguished and mapped within the Clinton quadrangle as part of the El Reno Group.

*Dog Creek Shale*, Pdc, reddish-brown shale with thin beds of siltstone and dolomite; thickness, about 220 feet; gradational eastward into the Chickasha Formation.

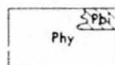
*Blaine Formation*, Pb, 3 to 4 gypsum and dolomite beds, about 100 to 200 feet thick, separated by reddish-brown shale. Gradational southward and eastward into Chickasha Formation.

*Flowerpot Shale*, Pf, reddish-brown shale containing several salt and gypsum beds in the upper part. Thickness, about 300 to 450 feet; gradational southward and eastward into the Chickasha Formation and Duncan Sandstone.

*Cedar Hills Sandstone*, Pch, greenish-gray siltstone and reddish-brown shales; thickness, about 180 feet; gradational southward into Duncan Sandstone.

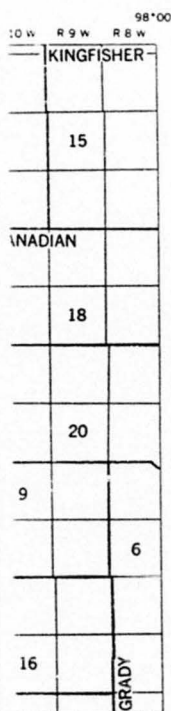
*Chickasha Formation*, Pc, reddish-brown to maroon mudstone conglomerate with some shale, siltstone, and fine- to coarse-grained sandstone; thickness, about 600 feet; gradational northward and westward into the Flowerpot Shale and the Blaine Formation, and westward into Dog Creek Shale.

*Duncan Sandstone*, Pd, light-gray and reddish-brown, cross-bedded, fine-grained sandstone and mudstone conglomerate with some interbedded yellowish gray and reddish brown shales; thickness, about 200 feet; gradational into the Cedar Hills Sandstone northward and into the Flowerpot Shale northward and westward.



#### HENNESSEY GROUP

Reddish-brown shale with some thin, greenish-gray siltstone and

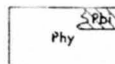


Cimarron

Cedar Hills Sandstone, Pch. Freshish-gray siltstone and reddish-brown shales; thickness, about 100 feet; gradational southward into Duncan Sandstone.

**Chickasha Formation.** Pc, reddish-brown to maroon mudstone conglomerate with some shale, siltstone, and fine- to coarse-grained sandstone; thickness, about 600 feet; gradational northward and westward into the Flowerpot Shale and the Blaine Formation, and westward into Dog Creek Shale.

**Duncan Sandstone.** Pd, light-gray and reddish-brown, cross-bedded, fine-grained sandstone and mudstone conglomerate with some interbedded yellowish-gray and reddish-brown shales; thickness, about 200 feet; gradational into the Cedar Hills Sandstone northward and into the Flowerpot Shale northward and westward.



## HENNESSEY GROUP

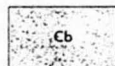
Reddish-brown shale with some thin, greenish-gray siltstone and orange-brown sandstone and siltstone beds; thickness, about 500 feet. The *Hennessey Group* is not subdivided in the southern part of the Clinton quadrangle; in the northeastern corner of the quadrangle, the upper part of the *Bison Formation*, Pbi, is exposed as orange-brown and greenish-gray, fine-grained sandstone and siltstone. The Bison is gradational southward into reddish-brown shale; it thins southward and is about 120 feet thick.

### UNCONFORMITY



## VIOLA LIMESTONE and BROMIDE FORMATION

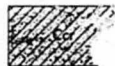
Limestone, limestone and shale interbedded, and sandstone; thickness, about 900 feet; one outlier is shown in southern part of quadrangle. Simpson and lower units covered.



ARBUCKLE GROUP and TIMBERED HILLS GROUP

Limestone and dolomite; one outlier at southern end of quadrangle, about 1,200 feet thick.

## UNCONFORMITY



## CARLTON RHYOLITE GROUP

Rhyolite flows and tuffs; about 4,500 feet thick; one outlier is shown in southern part of mapped area



## WICHITA GRANITE GROUP

Pink, medium-grained granite; three outliers have been mapped in southern part of quadrangle.

## Contact

2

**C**

Fault, approximately located; dotted where concealed; U, upthrown side; D, downthrown side

# OKLAHOMA GEOLOGICAL SURVEY

BULLETIN 114

PLATE 1. GEOLOGIC MAP OF CUSTER COUNTY

PLATE 2. ISOPACH AND STRUCTURE CONTOUR MAPS

PLATE 3. CORRELATION DIAGRAMS

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## QUATERNARY

## CRETACEOUS

## Holocene

## PLEISTOCENE

## COMANCHEAN

Qal

## ALLUVIUM

(Sand, silt, and clay, up to 132 feet thick, with gravel at the base, along major rivers and in stream valleys.)

## TERRACE DEPOSITS

(Scattered gravels and finer sediments, up to 100 feet thick, in several terrace levels along former courses of present-day streams, with Pearlette volcanic ash in T. 14 N., R. 16 W., in high terrace levels of late Kansan age. Qtw: Washita River deposits; Qth: Deer Creek deposits and Canadian River high-level terrace deposits; Qtl: Canadian River low-level deposits.)

unconformity

Kd

## DAKOTA GROUP

(unnamed lower sandstone)

(Brown to gray sandstone and quartzite blocks (Kd) up to 8 feet thick, in isolated collapsed structures in southwestern part of the county.)

**unconformity**

Kk

## KIOWA FORMATION

(Dark-gray to brown fossiliferous shale and Texigryphaea limestone blocks (Kk), in isolated collapsed structures.)

unconformity

Pec

## ELK CITY SANDSTONE

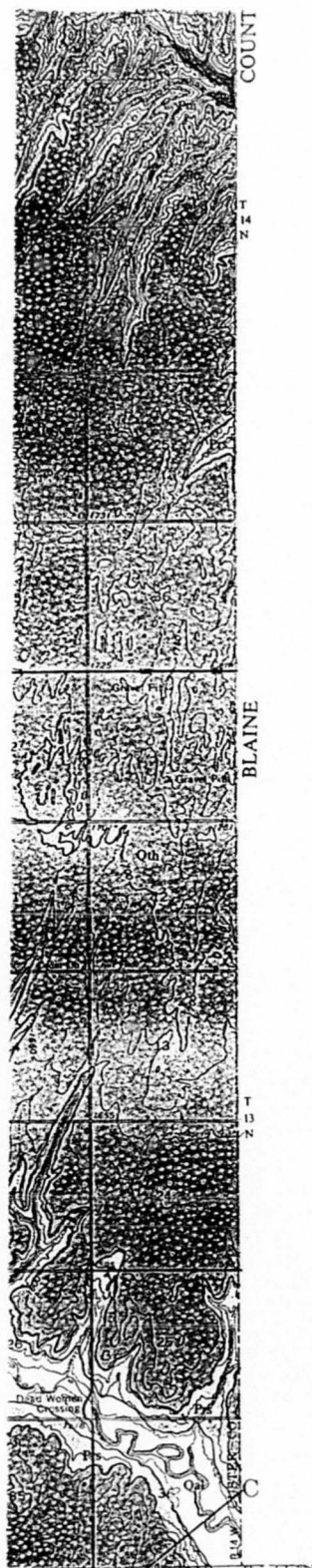
(Orange-brown sandstone as much as 50 feet thick, with top eroded, with prominent thin maroon shale about 14 feet above the base, and greenish-gray siltstone and shale at base.)

PdV

## DOXEY SHALE

(Red-brown shale and well-indurated siltstones, approximately 195 feet thick, with a 0.4-foot tan dolomite about 72 feet above the base, and a greenish-gray calcitic siltstone at the base.)





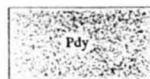
PERMIAN

CUSTERIAN

FOSS GROUP

WHITE HORSE GROUP

prominent thin maroon shale about 17 feet above the base, with greenish-gray siltstone and shale at base.)



#### DOXEY SHALE

(Red-brown shale and well-indurated siltstones, approximately 195 feet thick, with a 0.4-foot tan dolomite about 72 feet above the base, and a greenish-gray calcitic siltstone at the base.)



#### CLOUD CHIEF FORMATION

(Orange-brown to red-brown shale, siltstone, and sandstone, 171 to 177 feet thick, with the 0.1- to 10-foot Day Creek Bed (Pccd) 28 to 52 feet above the base, and a 1- to 9-foot gypsum, dolomite, greenish-gray zone or multiple zones (Moccasin Creek Bed) at base, gradational into as much as 118 feet of gypsum at the base in the Clinton-Weatherford area.)



#### RUSH SPRINGS FORMATION

(Primarily orange-brown quartzose sandstone, 300 to 430 feet thick, with the 1- to 8-foot Weatherford Bed (Prsw) of gypsum and dolomite 24 to 52 feet below top, and the 0.5- to 2-foot Old Crow Bed (Prso) of gypsum and dolomite 120 to 175 feet below top. The section is thicker southward, and the Weatherford Bed is primarily a dolomite eastward in the buttes along section E-E', gradational westward into gypsum. In the southwestern part of the county (section A-A') the Weatherford Bed is apparently absent. The Old Crow Bed is absent in the southeastern part of the county.)



#### MARLOW FORMATION

(Orange-brown sandstone, with the 0.1-foot maroon to pink Emanuel Bed (Pme) of dolomite at top, and the 0.1-foot dark-gray to maroon Relay Creek Bed (Pmr) 17 to 25 feet below top. Only upper 50 feet exposed. On south side of Canadian River in steep cliff faces, Emanuel and Relay Creek Beds are mapped together.)

Formational contact;  
dashed where inferred

A ————— B  
Line of cross section

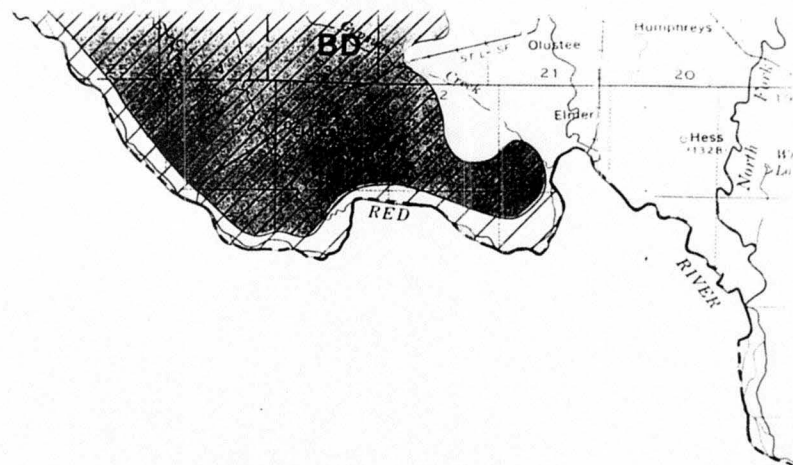
Contour interval 20 feet

beyond the known limits of the aquifer. REFERENCES: H.A.2; also

ps (Ordovician and Cambrian in age). Limestone and dolomite with sandstone in Arbuckle Mountains region of south-central Oklahoma. at 5,000 to 6,000 ft. Wells commonly yield 25 to 600 gpm of water (generally less than 500 mg/L dissolved solids). Recharge areas include Arbuckle strata; potential recharge areas extend 4 miles beyond aquifer. See Other Reports 8, 16, 33, 61.

Groups (Ordovician and Cambrian in age). Limestone and dolomite sandstone and shale in the Wichita Mountains-Lawton region of south-central Oklahoma. Thickness is about 5,000 to 6,000 ft. Wells commonly yield 25 to 600 gpm of good to fair quality (generally 300 to 2,000 mg/L dissolved solids). Recharge areas include limestone hills of Wichita Mountains (Caddo-Comanche); potential recharge areas include area underlain by aquifer around Lawton and other areas that extend 4 miles beyond limits of the aquifer. See Reports 27, 33, 61.

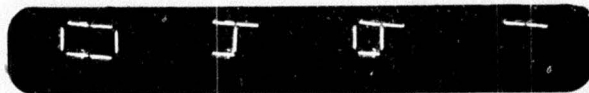
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# MAPS SHOWING PRINCIPAL GROUND-WATER RESOURCES AND RECHARGE AREAS IN OKLAHOMA: SHEET 2 - BEDROCK AQUIFERS AND RECHARGE AREAS

Compiled by  
Kenneth S. Johnson  
Oklahoma Geological Survey

1983



## BEDROCK AQUIFERS

Colored areas on the map show distribution of bedrock aquifers, which are the rock units generally considered favorable or moderately favorable for development of ground-water resources. Bedrock aquifers are listed below by geologic age from oldest to youngest. References, listed at the end of each aquifer description, include Hydrologic Atlases (HA) and Other Reports that provide more detailed information. All references are given in the 4-page pamphlet that accompanies this map.

Og

**Ogallala Formation** (Tertiary in age). Loosely cemented layers of fine- to medium-grained sand, silt, clay, and gravel in western Oklahoma and Panhandle; locally contains thin beds of caliche. Thickness generally ranges from 100 to 700 ft. in Panhandle and 100 to 400 ft. elsewhere. Wells commonly yield 25 to 1,500 gpm of water that is of good quality (generally less than 500 mg/L dissolved solids). Recharge areas include all areas where Ogallala crops out or is covered by younger porous and permeable sediments. References: HA-5, HA-8, HA-250, HA-373, HA-450; also Other Reports 12, 13, 17, 21, 22, 23, 24, 25, 26, 28, 30, 31, 32, 33, 40, 42, 43, 52, 54, 55, 61, 66.

An

**Antlers Sandstone** (Cretaceous in age). Loosely cemented fine-grained sand and sandstone with some layers of shale and clay in southeastern Oklahoma. The aquifer includes underlying Holly Creek Formation in T. 6 S., Rs. 24-27 E., of eastern McCurtain County. Antlers aquifer typically ranges from 200 to 700 ft. thick. Wells commonly yield 10 to 50 gpm, but in some areas they may yield up to 400 gpm. The water is of good quality (generally 200 to 1,000 mg/L dissolved solids). Recharge areas include outcrops of Antlers Sandstone and overlying Goodland Limestone; potential recharge areas include areas where aquifer underlies younger Cretaceous strata in the south. References: HA-3, HA-9; also Other Reports 9, 20, 33, 61.

EI

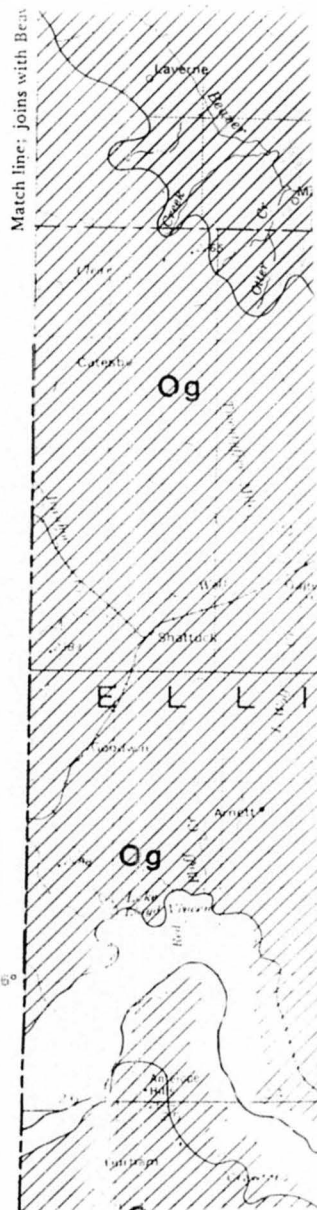
**Elk City Sandstone** (Permian in age). Fine-grained sandstone with minor amounts of silt and clay in southwestern Oklahoma. Maximum thickness is about 185 ft. Wells commonly yield 25 to 300 gpm of water that is of good quality (generally less than 500 mg/L dissolved solids). Recharge areas include all outcrops of Elk City Sandstone. References: HA-5; also Other Reports 35, 47, 61.

RM

**Rush Springs Sandstone and Marlow Formation** (Permian in age). Fine-grained sandstone with some layers of gypsum, shale, and dolomite in western Oklahoma. The amount of shale increases in Dewey County and farther north. Thickness of aquifer ranges from 400 ft. in the south to 200 ft. in the north. Wells commonly yield 25 to 300 gpm of water that is of good quality (generally 200 to 1,000 mg/L dissolved solids), although in some areas of Dewey County and farther north the water locally is of fair to poor quality (1,500 to 4,000 mg/L dissolved solids). Recharge areas include Rush Springs and Marlow outcrops and extend to limits of outcrop on south and east; recharge areas also include outcrops of gypsum and other rocks of overlying Cloud Chief Formation in parts of Caddo, Custer, and Washita Counties. Potential recharge areas in the west extend 4 miles beyond the western limit of the aquifer. References: HA-3, HA-5, HA-6, HA-8; also Other Reports 6, 7, 15, 19, 33, 41, 46, 56, 53, 61, 64, 69.

BD

**Blaine and Dog Creek Formations** (Permian in age). Gypsum and dolomite layers (locally fractured or cavernous) interbedded with shale in southwestern Oklahoma. The total thickness of the aquifer (the lower part of the Dog Creek Formation and the entire Blaine Formation) is about 250 ft. Wells commonly yield 300 to 2,500 gpm of water that is of fair to poor quality (generally 1,500 to 6,000 mg/L dissolved solids). Recharge areas are outcrops of Blaine, Dog Creek, Rush Springs, and Marlow Formations that overlie the aquifer. Potential recharge areas include other outcrops of Rush Springs, Marlow, Dog Creek, and Blaine strata that dip toward the aquifer. References: HA-5, HA-6; also Other Reports 33, 56, 61, 62.



**REFERENCE 7**

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13

## MEMORANDUM

**DATE:** July 27, 1992  
**TO:** Ray Wichert Property PA Site File  
**FROM:** Tim Daly, OSDH  
**RE:** Air and Groundwater Targets

### Air

The estimated population residing within the study area was determined by counting the number of residences between 0 - 1/2 and 3 - 4 miles from the site on appropriate USGS maps<sup>1</sup> and the use of 1990 census data<sup>2</sup> to find the number of persons per household. The GEMS<sup>3</sup> data base was used for determining populations between the 1/2 and 3 mile radii. The estimated residing population per study radii is described below.

Study Radius (mi)	Estimated Residences	Total Number of Estimate Residents
On-site	0	0 X 2.55
0 - 1/4	28	28 X 2.55
1/4 - 1/2	25	25 X 2.55
1/2 - 1	NA	1969
1 - 2	NA	3703
2 - 3	NA	3124
3 - 4	55 (Custer) 20 (Washita)	55 X 2.55 (Custer) 20 X 2.53 (Washita)
<b>TOTAL</b>	<b>53 Residences (0 to 1/2 miles) NA (1/2 to 3 miles) 75 Residences (3 to 4 miles)</b>	<b>135.2 + 8796 + 140.3 + 50.6 = 9122.1</b>

### Groundwater

#### *Public Water Supply Wells*

According to available information, there are no public water supply well systems in the study area<sup>4</sup>.

#### *Private Wells*

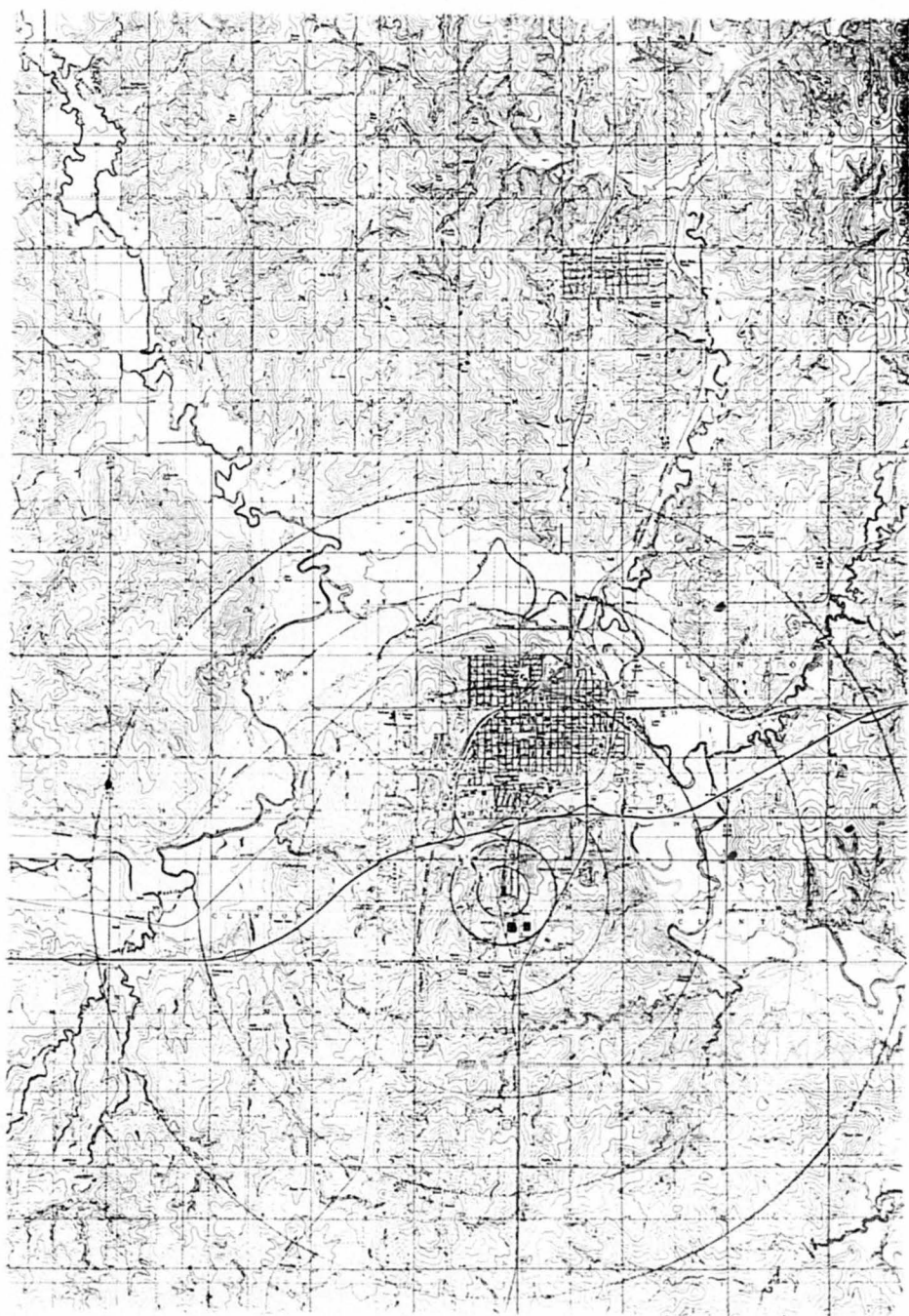
Based on available information, the city of Clinton is currently supplied by the Clinton water supply. The estimated population using private water wells in the study area (determined by well logs) is described below<sup>5</sup>. The number of residences residing within the study area was determined as discussed under the **Air** section of this memo<sup>1,2</sup>.

Distance from site (mi)	# Residences (as per Air Pathway)	# Residences using Pri- vate Wells	Estimated Population Served by Private Wells
On-site	0	0	0
0 - 1/4	28	0	0
1/4 - 1/2	25	0	0
1/2 - 1	NA	0	0
1 - 2	NA	0	0
2 - 3	NA	1	2.7
3 - 4	70	2	5
<b>Subtotal</b>	<b>123</b>	<b>3</b>	<b>7.7</b>

- 1 USGS. 15 Minute Topographic Quadrangle Maps of Bessie, Okla. 1983, Dill City NE, Okla. 1983, Stafford, Okla. 1983, and Clinton, Okla. 1983.
- 2 USDC. Selected Population and Housing Characteristics: 1990. Custer County, Oklahoma, and Washita County, Oklahoma.
- 3 GEMS - 1980 Population Data for Ray Wichert Property. Compiled by RLB, OSDH. May 12, 1992.
- 4 Public Water Supply Systems in T11N R16W, T11N R17W, T12N R16W, T12N R17W, T12N R18W, T13N R16W and, T13N R17W. List generated by Terry Clingman, OSDH from Environmental Health Services' database. April 29, 1992.
- 5 State of Oklahoma Water Resources Board. Multi-Purpose Water Well Report. Recieved March 22, 1984.







0 7 9 5

Table 1. Selected Population and Housing Characteristics: 1990  
Custer County, Oklahoma

The population counts set forth herein are subject to possible correction for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 1, 1991.

Total population	26,897	Total housing units	11,636
SEX		OCCUPANCY AND TENURE	
Male	13,131	Occupied housing units	9,918
Female	13,766	Owner occupied	6,293
		Percent owner occupied	63.5
AGE		Renter occupied	3,625
Under 5 years	1,924	Vacant housing units	1,718
5 to 17 years	5,191	For seasonal, recreational, or occasional use	180
18 to 20 years	2,204	Homeowner vacancy rate (percent)	3.3
21 to 24 years	2,184	Rental vacancy rate (percent)	13.5
25 to 44 years	7,446		
45 to 54 years	2,353	Persons per owner-occupied unit	2.61
55 to 59 years	1,032	Persons per renter-occupied unit	2.46
60 to 64 years	975	Units with over 1 person per room	389
65 to 74 years	1,801		
75 to 84 years	1,338	UNITS IN STRUCTURE	
85 years and over	449	1-unit, detached	8,102
Median age	29.7	1-unit, attached	198
		2 to 4 units	803
Under 18 years	7,115	5 to 9 units	455
Percent of total population	26.5	10 or more units	560
65 years and over	3,588	Mobile home, trailer, other	1,518
Percent of total population	13.3		
HOUSEHOLDS BY TYPE		VALUE	
Total households	9,918	Specified owner-occupied units	4,691
Family households (families)	6,851	Less than \$50,000	2,503
Married-couple families	5,693	\$50,000 to \$99,999	1,842
Percent of total households	57.4	\$100,000 to \$149,999	251
Other family, male householder	275	\$150,000 to \$199,999	61
Other family, female householder	883	\$200,000 to \$299,999	30
Nonfamily households	3,067	\$300,000 or more	4
Percent of total households	30.9	Median (dollars)	46,900
Householder living alone	2,519		
Householder 65 years and over	1,016	CONTRACT RENT	
		Specified renter-occupied units	
Persons living in households	25,333	paying cash rent	3,217
Persons per household	2.55	Less than \$250	2,116
		\$250 to \$499	1,061
GROUP QUARTERS		\$500 to \$749	36
Persons living in group quarters	1,564	\$750 to \$999	3
Institutionalized persons	576	\$1,000 or more	1
Other persons in group quarters	988	Median (dollars)	219
RACE AND HISPANIC ORIGIN		RACE AND HISPANIC ORIGIN	
White	22,896	OF HOUSEHOLDER	
Black	930	Occupied housing units	9,918
Percent of total population	3.5	White	8,849
American Indian, Eskimo, or Aleut	1,660	Black	292
Percent of total population	6.2	Percent of occupied units	2.9
Asian or Pacific Islander	169	American Indian, Eskimo, or Aleut	407
Percent of total population	0.6	Percent of occupied units	4.1
Other race	1,242	Asian or Pacific Islander	44
Hispanic origin (of any race)	1,625	Percent of occupied units	0.4
Percent of total population	6.0	Other race	326
		Hispanic origin (of any race)	400
		Percent of occupied units	4.0

The user should note that there are limitations to many of these data. Please refer to the technical documentation provided with Summary Tape File 1A for a further explanation on the limitations of the data.

Table 1. Selected Population and Housing Characteristics: 1990  
Washita County, Oklahoma

The population counts set forth herein are subject to possible correction for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 1, 1991.

Total population	11,441	Total housing units	6,101
SEX		OCCUPANCY AND TENURE	
Male	5,524	Occupied housing units	4,421
Female	5,917	Owner occupied	3,384
		Percent owner occupied	76.5
AGE		Renter occupied	1,037
Under 5 years	768	Vacant housing units	1,680
5 to 17 years	2,321	For seasonal, recreational, or occasional use	54
18 to 20 years	344	Homeowner vacancy rate (percent)	3.3
21 to 24 years	424	Rental vacancy rate (percent)	44.7
25 to 44 years	3,020		
45 to 54 years	1,160	Persons per owner-occupied unit	2.47
55 to 59 years	549	Persons per renter-occupied unit	2.73
60 to 64 years	591	Units with over 1 person per room	117
65 to 74 years	1,169		
75 to 84 years	809	UNITS IN STRUCTURE	
85 years and over	286	1-unit, detached	4,542
Median age	36.8	1-unit, attached	789
Under 18 years	3,089	2 to 4 units	50
Percent of total population	27.0	5 to 9 units	43
65 years and over	2,264	10 or more units	60
Percent of total population	19.8	Mobile home, trailer, other	617
HOUSEHOLDS BY TYPE		VALUE	
Total households	4,421	Specified owner-occupied units	2,313
Family households (families)	3,291	Less than \$50,000	1,811
Married-couple families	2,901	\$50,000 to \$99,999	433
Percent of total households	65.6	\$100,000 to \$149,999	56
Other family, male householder	106	\$150,000 to \$199,999	9
Other family, female householder	284	\$200,000 to \$299,999	3
Nonfamily households	1,130	\$300,000 or more	1
Percent of total households	25.6	Median (dollars)	28,400
Householder living alone	1,064		
Householder 65 years and over	621	CONTRACT RENT	
Persons living in households	11,199	Specified renter-occupied units paying cash rent	732
Persons per household	2.53	Less than \$250	545
		\$250 to \$499	179
GROUP QUARTERS		\$500 to \$749	8
Persons living in group quarters	242	\$750 to \$999	-
Institutionalized persons	238	\$1,000 or more	-
Other persons in group quarters	4	Median (dollars)	181
RACE AND HISPANIC ORIGIN		RACE AND HISPANIC ORIGIN OF HOUSEHOLDER	
White	10,948	Occupied housing units	4,421
Black	20	White	4,294
Percent of total population	0.2	Black	9
American Indian, Eskimo, or Aleut	260	Percent of occupied units	0.2
Percent of total population	2.3	American Indian, Eskimo, or Aleut	68
Asian or Pacific Islander	28	Percent of occupied units	1.5
Percent of total population	0.2	Asian or Pacific Islander	5
Other race	185	Percent of occupied units	0.1
Hispanic origin (of any race)	406	Other race	45
Percent of total population	3.5	Hispanic origin (of any race)	103
		Percent of occupied units	2.3

The user should note that there are limitations to many of these data. Please refer to the technical documentation provided with Summary Tape File 1A for a further explanation on the limitations of the data.

Alt-Z Help |Alt-Tab Menu| EC | | |FDX|CR| | MTEZ by MagicSoft, Inc.  
 Enter the next ring distance  
 GEMS>

Enter program execution mode: B (batch) or I (interactive)  
 GEMS> I

R. WICHERT PROPERTY

LATITUDE 35:29:24 LONGITUDE 98:58:41 1980 POPULATION

KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	0	0	0	3677	3124	0	6801
S 2	0	0	1172	0	0	0	1172
S 3	0	0	0	0	0	0	0
S 4	0	0	0	0	0	0	0
S 5	0	0	0	26	0	0	26
S 6	0	0	797	0	0	0	797
RING TOTALS	0	0	1969	3703	3124	0	8796

press RETURN to continue

SE 611211  
 72 111111

*compiled by RAB 5/12/92.*

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# Memo

TO: Terry Klingenstein

DATE 4/29/92

FROM: Richard Brooks

This is the PWS Information Requests for sites that we will be conducting preliminary assessments for the remaining fiscal federal year. There is no "rush" on this.

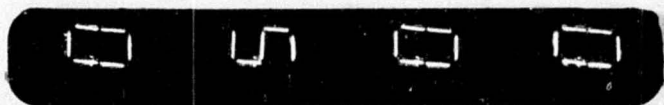
Thinks

RB

Date Requests Completed - 4/30/92

Phone # 2049

ODH Form 50A



April 29, 1992

**PWS Information Request**

for the

**Raymond Wichert Property/ Sooner Dial Co. Site(s)**

<b>County</b>	<b>Township</b>	<b>Range</b>	<b>Meridian</b>
Washita	11N	16W	1M
Washita	11N	17W	1M
Custer	12N	16W	1M
Custer	12N	17W	1M
Custer	12N	18W	1M
Custer	13N	16W	1M
Custer	13N	17W	1M





PWSID SYSTEM  
2007608 LITTLE SAHARA SP & REC

SOURCEID SOURCE  
03 WELL #3

AQUIFER  
C1M TERRACE

DEPTH LOCATION  
00040 NW4SW4SW4S26T12NR16W1M A

ACTIVITY TYPE  
C

0

5

0

2

Site - Water Resources Board  
Primary - Drillers Copy  
Secondary - Drillers Copy

STATE OF OKLAHOMA  
WATER RESOURCES BOARD  
1600 N.E. 10th St. P.O. Box 53585  
Oklahoma City, Oklahoma 73152

Application No. \_\_\_\_\_  
Aquifer \_\_\_\_\_  
Steam System Code \_\_\_\_\_  
Use Code \_\_\_\_\_  
County \_\_\_\_\_  
(Official Use Only)

420329

MAR 22 1984

MULTI-PURPOSE WATER WELL REPORT

Oklahoma Water Resources Board

NW

OWNER Bill Price ADDRESS P.O. Box 187, Hattanooga, OK  
73772 PHONE \_\_\_\_\_

LEGAL DESCRIPTION OF WELL

C9W 1/4 of SW 1/4 of SW 1/4 of sec. 19 : TWP. 12 S. Rge. 16 EIM WIM Custer  
ECM: COUNTY Blaine

TYPE OF WORK

New Well ☐ Plugging  
Reconditioning Work ☐ Test

4. PROPOSED / PAST USE

☒ Domestic ☐ Irrigation ☐ Stock  
☐ Municipal ☐ Industrial ☐ Test

5. DRILLING METHOD

☒ Rotary ☐ Rev. Rotary  
☐ Cable ☐ Other \_\_\_\_\_

LOGS 1. LOGS 2. LOGS 3. LOGS 4. LOGS 5. LOGS 6. LOGS 7. NEW WELL CONSTRUCTION DATA

Material	From	To	Notes
p Soil & fine Sand	0	35	
ind med. to coarse	35	60	
ft Sand rock	60	72	
nd rock w/ hard ft layers	72	140	

Dates: Started 3-7-84 Completed 3-7-84  
Contractor Embank, Inc.  
Driller \_\_\_\_\_  
Diameter Hole 7 7/8 in. Total Depth 140 ft.

CASING RECORD

Diameter 4 1/2 in. From 0 ft. To 140 ft.  
Surface Seal: ☒ Yes ☐ No Type: Cement  
Depth of Seal: 11 ft.  
Gravel Packed: 4 ft.  
Gravel Packed From 11 ft. to 140 ft.  
Amount Used: 1 1/2 yds

PERFORATION RECORD

Type EM Perfor From 70 ft. To 140 ft.  
Size \_\_\_\_\_ From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
" \_\_\_\_\_ From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.

8. WELL TEST DATA

Static Water Level Below Land Surface 60 ft.  
If Artesian: Flows \_\_\_\_\_ gpm.  
Water Temp. \_\_\_\_\_ °C / Quality \_\_\_\_\_

BAILER TEST

Drawdown \_\_\_\_\_ ft. After Pumping \_\_\_\_\_ hrs. At \_\_\_\_\_ gpm.  
Size of Bailer: \_\_\_\_\_ gal.

PUMPING TEST

Drawdown 90 ft. After Pumping 2 hrs. At 10 gpm.

9. PLUGGING DATA

Date Plugged \_\_\_\_\_  
Backfilled With \_\_\_\_\_ Material To \_\_\_\_\_ ft.  
Grouted or Cemented From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Plot Location in Item 11. Show Distances From 2 Section Lines.

10. RECONDITIONING WORK

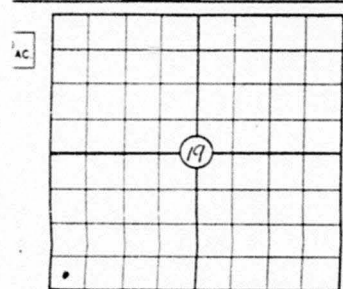
Date Completed \_\_\_\_\_  
☐ Replaced Casing From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
☐ Replaced Screen From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Deepened Well From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Redeveloped Well By \_\_\_\_\_

13. CERTIFICATION

The work described above was done under my supervision, and this report is true and correct to the best of my knowledge.

Name Embank, Inc. License # WD-9  
Address 901 South Main Phone # \_\_\_\_\_  
Fairview, Oklahoma  
Signed \_\_\_\_\_ Date \_\_\_\_\_

PLAT



W 1/4 of SW 1/4 of SW 1/4 of SEC 19

P 12 S: RGE 16 EIM WIM ECM

PUMP INFORMATION

Imp Type \_\_\_\_\_  
Power Source \_\_\_\_\_  
Rated Capacity \_\_\_\_\_ gpm.  
Depth of Bowls or Cylinder \_\_\_\_\_ ft.

USE ADDITIONAL SHEETS IF NECESSARY

White - Water Resources Board  
Canary - Drillers Copy  
Pink - Drillers Copy

STATE OF OKLAHOMA  
WATER RESOURCES BOARD  
1000 N E 10th St. P.O. Box 53585  
Oklahoma City, Oklahoma 73152

Application No. \_\_\_\_\_  
Aquifer \_\_\_\_\_  
Steam System Code \_\_\_\_\_  
Use Code \_\_\_\_\_  
County \_\_\_\_\_  
(Official Use Only)

MULTI-PURPOSE WATER WELL REPORT

1. OWNER ALBERT E. PECK ADDRESS Rt 4, Box 240, Clinton, Ok 73601

2. LEGAL DESCRIPTION OF WELL

SE  $\frac{1}{4}$  of NW  $\frac{1}{4}$  of SW  $\frac{1}{4}$  of sec. 20 TWP. 12 N R. 16 W. M. COUNTY CUSTER

3. TYPE OF WORK

☒ New Well ☐ Plugging  
☐ Reconditioning Work ☐ Test

4. PROPOSED / PAST USE

☒ Domestic ☐ Irrigation ☐ Stock  
☐ Municipal ☐ Industrial ☐ Test

5. DRILLING METHOD

☒ Rotary ☐ Rev. Rotary  
☐ Cable ☐ Other

6. LOG

Material	From	To	Saturated
Soil	0	5	
Sand	5	55	
Shale	55	65	
Shale & Clay	65	90	
Shale	90	115	
Shale & Sand	115	160	
Sand	160	165	
Shale & Sand	165	300	
Mostly Sand	300	400	

7. NEW WELL CONSTRUCTION DATA

Dates: Started 2-22-84 Completed 2-22-84  
Contractor Ainsworth Oilfield Equip., Inc.  
Driller A. Ainsworth  
Diameter Hole 9-7/8 in. Total Depth 440 ft.

CASING RECORD

Diameter From To  
6" PVC in. 0 ft. 440 ft.  
Surface Seal: ☐ Yes ☐ No Type: \_\_\_\_\_  
Depth of Seal: 10 ft.  
Gravel Packed: \_\_\_\_\_  
Gravel Packed From 12 ft. to 440 ft.  
Amount Used: \_\_\_\_\_

PERFORATION RECORD

Type 6" PVC From 420 ft. To 380 ft.  
Size 6" PVC From 360 ft. To 260 ft.  
" 6" PVC From 240 ft. To 200 ft.

8. WELL TEST DATA

Static Water Level Below Land Surface \_\_\_\_\_ ft.  
If Artesian: Flows \_\_\_\_\_ gpm.  
Water Temp. \_\_\_\_\_ °C / f Quality \_\_\_\_\_

BAILER TEST

Drawdown \_\_\_\_\_ ft. After Pumping \_\_\_\_\_ hrs. At \_\_\_\_\_ gpm.  
Size of Bailer: \_\_\_\_\_ gal.

PUMPING TEST

Drawdown 80 ft. After Pumping 4 hrs. At \_\_\_\_\_ gpm.

9. PLUGGING DATA

Date Plugged \_\_\_\_\_  
Backfilled With \_\_\_\_\_ Material To \_\_\_\_\_ ft.  
Grouted or Cemented From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Plot Location in Item 11. Show Distances From 2 Section Lines.

10. RECONDITIONING WORK

Date Completed \_\_\_\_\_  
☐ Replaced Casing From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
☐ Replaced Screen From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Deepened Well From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Redeveloped Well By \_\_\_\_\_

11. CERTIFICATION

The work described above was done under my supervision, and this report is true and correct to the best of my knowledge.

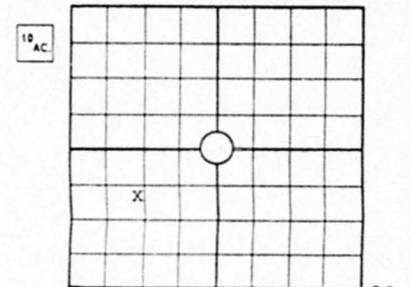
Name A. Ainsworth License # WD-193  
Address Rt 2 Box 33, Cordell, Ok Phone # 674-3339  
Signed A. Ainsworth Date 3-05-84

USE ADDITIONAL SHEETS IF NECESSARY

RECEIVED  
MAR 15 1984

Oklahoma Water Resources Board

11. PLAT



SE  $\frac{1}{4}$  of NW  $\frac{1}{4}$  of SW  $\frac{1}{4}$  of SEC 20

TWP. 12 N R. 16 W. M. COUNTY CUSTER

12. PUMP INFORMATION

Pump Type \_\_\_\_\_  
Power Source \_\_\_\_\_  
Rated Capacity \_\_\_\_\_ gpm.  
Depth of Bowls or Cylinder \_\_\_\_\_ ft.

White—Water Resources Board  
Canary—Driller's Copy  
Pink—Customer's Copy

STATE OF OKLAHOMA  
**MULTI-PURPOSE WELL REPORT**  
OKLAHOMA WATER RESOURCES BOARD  
1000 N.E. 10th St., P.O. Box 53585  
Oklahoma City, Oklahoma 73152

#23076

1. WELL OWNER BOB SMITH PHONE \_\_\_\_\_

2. LEGAL DESCRIPTION SE 1/4 of NE 1/4 of NE 1/4 of sec. 24, TWP. 12 N, RGE. 18 E, COUNTY CUSTER

FINDING LOCATION \_\_\_\_\_

Blocks or distance(s) from given point(s)

3. TYPE OF WORK

- ☒ New Well ☐ Plugging  
☐ Reconditioning Work  
☐ Monitoring  
☐ Test Hole  
☐ Other \_\_\_\_\_

4. USE

- ☒ Domestic  
☐ Stock  
☐ Monitoring  
☐ Test Hole  
☐ Other \_\_\_\_\_

NON-DOMESTIC

- ☐ Irrigation  
☐ Municipal  
☐ Industrial  
☐ Commercial  
☐ Other \_\_\_\_\_

5. DRILLING METHOD

- ☒ Fluid Rotary ☐ Rev. Rotary  
☐ Cable ☐ Other \_\_\_\_\_  
☐ Air Rotary  
☐ H S. Auger

Material	From	To	Separated
CLAY	0	30'	
SHALE	30'	230'	
GYP SUM	230	240	
SHALE +	240	381	
CLAY STREAKS			
GYP SUM	380	386'	
SHALE	386	420'	
SANDSTONE	420	470'	

If this well is Non-Domestic, has the location been permitted?  
☐ Yes ☐ No Permit No. \_\_\_\_\_

DATES: Started JUNE 6 '90 Completed JUNE 9 '90  
Contractor W. H. MYERS DRILLING CO. INC.  
Driller W. H. MYERS  
Diameter Hole 8" in. Total Depth 470 ft.

CASING RECORD

Diameter	From	To
Surface Pipe	_____ in.	_____ ft.
Well Casing	<u>5" PVC</u> in.	<u>+1</u> ft. <u>470</u> ft.
Cement Grout Surface Seal?	<u>Yes</u> <input checked="" type="checkbox"/> <u>No</u> <input type="checkbox"/>	
Type of Surface Seal	<u>CEMENT</u>	Depth of Seal: <u>10</u> ft.
GRAVEL PACK:		
Gravel Packed From	<u>10</u> ft.	to <u>470</u> ft.
Amount Used:	<u>4 1/4 TON</u>	

PERFORATION RECORD

Type/Size	From	To
<u>5" PVC SLOT</u>	<u>410</u> ft.	<u>470</u> ft.
	_____ ft.	_____ ft.
	_____ ft.	_____ ft.

WELL TEST DATA

Static Water Level	Pump Type <u>SUB</u>
Below Land Surface <u>95</u> ft.	Power Source <u>ELECTRIC</u>
Approximate Yield <u>20</u> gpm.	Rated Capacity <u>10</u> gpm.
If Artesian: Flows _____ gpm.	Depth of Bowls or Cylinder <u>180</u> ft.

PLUGGING

Date Plugged \_\_\_\_\_  
Backfilled With \_\_\_\_\_ Material To \_\_\_\_\_ ft.  
Grouted or Cemented From \_\_\_\_\_ Ft. To \_\_\_\_\_ ft.

RECONDITIONING WORK

Date Completed \_\_\_\_\_  
Replaced Casing From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Replaced Screen From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Deepened Well From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Redeveloped Well By \_\_\_\_\_

The work described above was done under my supervision, and this report is true and correct to the best of my knowledge.

Name W. H. MYERS License WB 24  
Address CLINTON, OKLA 73601 Phone 323-2787  
Signed W. H. Myers Date 4/15/90

#20345

MULTI-PURPOSE WATER WELL REPORT

OWNER Fred. Kuyper ADDRESS NE of CITY  
CAINTON, OKLA 73601 PHONE 323-0600

LEGAL DESCRIPTION OF WELL  
NE 1/4 of NE 1/4 of SE 1/4 of sec. 12 TWP. 12 N S. Rge. 17 EIM  
WIM  
ECM: COUNTY CASHER

1. TYPE OF WORK  
☒ New Well ☐ Plugging  
☐ Reconditioning Work ☐ Test

4. PROPOSED / PAST USE  
☒ Domestic ☐ Irrigation ☐ Stock  
☐ Municipal ☐ Industrial ☐ Test

5. DRILLING METHOD  
☒ Rotary ☐ Rev. Rotary  
☐ Cable ☐ Other

6. LOG			
Material	From	To	Notes
TOP SOIL	0	5	
CLAY	5	100	
SHALE	100	180	
GYPSON	180	185	
SANDSTONE	185	200	

7. NEW WELL CONSTRUCTION DATA  
Dates: Started AUG 8 '83 Completed AUG 12 '83  
Contractor MYERS DRILLING CO INC  
Driller W.L. MYERS  
Diameter Hole 8 in. Total Depth 200 ft.

CASING RECORD  
Diameter From To  
5 in. 0 ft. 200 ft.  
Surface Seal: ☒ Yes ☐ No Type: CEMENT  
Depth of Seal: 10 ft.  
Gravel Packed:  
Gravel Packed From 10 ft. to 200 ft.  
Amount Used: 4 TONS

PERFORATION RECORD  
Type SLOT From 160 ft. To 200 ft.  
Size 5" From 160 ft. To 200 ft.  
" From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.

8. WELL TEST DATA  
Static Water Level Below Land Surface 80 ft.  
If Artesian: Flows \_\_\_\_\_ gpm.  
Water Temp. \_\_\_\_\_ °C/F Quality HARD GYPSON

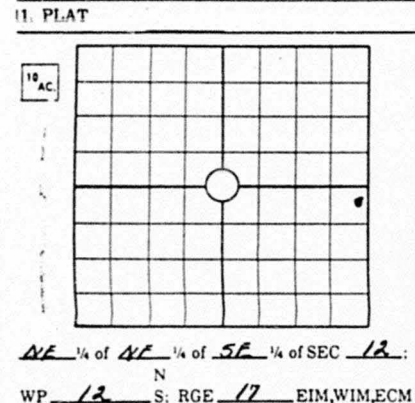
BAILEY TEST  
Drawdown \_\_\_\_\_ ft. After Pumping \_\_\_\_\_ hrs. At \_\_\_\_\_ gpm.  
Size of Bailor: \_\_\_\_\_ gal.

PUMPING TEST  
Drawdown 70 ft. After Pumping 10 hrs. At 10 gpm.

9. PLUGGING DATA  
Date Plugged \_\_\_\_\_  
Backfilled With \_\_\_\_\_ Material To \_\_\_\_\_ ft.  
Grouted or Cemented From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Plot Location in Item 11. Show Distances From 2 Section Lines.

10. RECONDITIONING WORK  
Date Completed \_\_\_\_\_  
☐ Replaced Casing From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
☐ Replaced Screen From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Deepened Well From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Redeveloped Well By \_\_\_\_\_

13. CERTIFICATION  
The work described above was done under my supervision, and this report is true and correct to the best of my knowledge.  
Name W.L. MYERS License # WD-24  
Address RT. 3 BOX 9 CAINTON, OK. 73601 Phone # 323-2784  
Signed \_\_\_\_\_ Date \_\_\_\_\_



2. PUMP INFORMATION  
Pump Type CYLINDER  
Power Source WIND  
Rated Capacity 5 gpm.  
Depth of Bowls or Cylinder \_\_\_\_\_ ft.

USE ADDITIONAL SHEETS IF NECESSARY



**REFERENCE 8**

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Table 1. Selected Population and Housing Characteristics: 1990  
Custer County, Oklahoma

The population counts set forth herein are subject to possible correction for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 1, 1991.

Total population	26,897	Total housing units	11,636
SEX		OCCUPANCY AND TENURE	
Male	13,131	Occupied housing units	9,918
Female	13,766	Owner occupied	6,293
		Percent owner occupied	63.5
AGE		Renter occupied	3,625
Under 5 years	1,924	Vacant housing units	1,718
5 to 17 years	5,191	For seasonal, recreational, or occasional use	180
18 to 20 years	2,204	Homeowner vacancy rate (percent)	3.3
21 to 24 years	2,184	Rental vacancy rate (percent)	13.5
25 to 44 years	7,446		
45 to 54 years	2,353	Persons per owner-occupied unit	2.61
55 to 59 years	1,032	Persons per renter-occupied unit	2.46
60 to 64 years	975	Units with over 1 person per room	389
65 to 74 years	1,801		
75 to 84 years	1,338	UNITS IN STRUCTURE	
85 years and over	449	1-unit, detached	8,102
Median age	29.7	1-unit, attached	198
		2 to 4 units	803
Under 18 years	7,115	5 to 9 units	455
Percent of total population	26.5	10 or more units	560
65 years and over	3,588	Mobile home, trailer, other	1,518
Percent of total population	13.3	VALUE	
HOUSEHOLDS BY TYPE		Specified owner-occupied units	4,691
Total households	9,918	Less than \$50,000	2,503
Family households (families)	6,851	\$50,000 to \$99,999	1,842
Married-couple families	5,693	\$100,000 to \$149,999	251
Percent of total households	57.4	\$150,000 to \$199,999	61
Other family, male householder	275	\$200,000 to \$299,999	30
Other family, female householder	883	\$300,000 or more	4
Nonfamily households	3,067	Median (dollars)	46,900
Percent of total households	30.9	CONTRACT RENT	
Householder living alone	2,519	Specified renter-occupied units paying cash rent	3,217
Householder 65 years and over	1,016	Less than \$250	2,116
Persons living in households	25,333	\$250 to \$499	1,061
Persons per household	2.55	\$500 to \$749	36
GROUP QUARTERS		\$750 to \$999	3
Persons living in group quarters	1,564	\$1,000 or more	1
Institutionalized persons	576	Median (dollars)	219
Other persons in group quarters	988	RACE AND HISPANIC ORIGIN OF HOUSEHOLDER	
RACE AND HISPANIC ORIGIN		Occupied housing units	9,918
White	22,896	White	8,849
Black	930	Black	292
Percent of total population	3.5	Percent of occupied units	2.9
American Indian, Eskimo, or Aleut	1,660	American Indian, Eskimo, or Aleut	407
Percent of total population	6.2	Percent of occupied units	4.1
Asian or Pacific Islander	169	Asian or Pacific Islander	44
Percent of total population	0.6	Percent of occupied units	0.4
Other race	1,242	Other race	326
Hispanic origin (of any race)	1,625	Hispanic origin (of any race)	400
Percent of total population	6.0	Percent of occupied units	4.0

The user should note that there are limitations to many of these data. Please refer to the technical documentation provided with Summary Tape File 1A for a further explanation on the limitations of the data.

Table 1. Selected Population and Housing Characteristics: 1990  
Washita County, Oklahoma

The population counts set forth herein are subject to possible correction for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 1, 1991.

Total population	11,441	Total housing units	6,101
SEX		OCCUPANCY AND TENURE	
Male	5,524	Occupied housing units	4,421
Female	5,917	Owner occupied	3,384
		Percent owner occupied	76.5
AGE		Renter occupied	1,037
Under 5 years	768	Vacant housing units	1,680
5 to 17 years	2,321	For seasonal, recreational, or occasional use	54
18 to 20 years	344	Homeowner vacancy rate (percent)	3.3
21 to 24 years	424	Rental vacancy rate (percent)	44.7
25 to 44 years	3,020		
45 to 54 years	1,160	Persons per owner-occupied unit	2.47
55 to 59 years	549	Persons per renter-occupied unit	2.73
60 to 64 years	591	Units with over 1 person per room	117
65 to 74 years	1,169		
75 to 84 years	809	UNITS IN STRUCTURE	
85 years and over	286	1-unit, detached	4,542
Median age	36.8	1-unit, attached	789
Under 18 years	3,089	2 to 4 units	50
Percent of total population	27.0	5 to 9 units	43
65 years and over	2,264	10 or more units	60
Percent of total population	19.8	Mobile home, trailer, other	617
HOUSEHOLDS BY TYPE		VALUE	
Total households	4,421	Specified owner-occupied units	2,313
Family households (families)	3,291	Less than \$50,000	1,811
Married-couple families	2,901	\$50,000 to \$99,999	433
Percent of total households	65.6	\$100,000 to \$149,999	56
Other family, male householder	106	\$150,000 to \$199,999	9
Other family, female householder	284	\$200,000 to \$299,999	3
Nonfamily households	1,130	\$300,000 or more	1
Percent of total households	25.6	Median (dollars)	28,400
Householder living alone	1,064		
Householder 65 years and over	621	CONTRACT RENT	
Persons living in households	11,199	Specified renter-occupied units paying cash rent	732
Persons per household	2.53	Less than \$250	545
GROUP QUARTERS		\$250 to \$499	179
Persons living in group quarters	242	\$500 to \$749	8
Institutionalized persons	238	\$750 to \$999	-
Other persons in group quarters	4	\$1,000 or more	-
		Median (dollars)	181
RACE AND HISPANIC ORIGIN		RACE AND HISPANIC ORIGIN OF HOUSEHOLDER	
White	10,948	Occupied housing units	4,421
Black	20	White	4,294
Percent of total population	0.2	Black	9
American Indian, Eskimo, or Aleut	260	Percent of occupied units	0.2
Percent of total population	2.3	American Indian, Eskimo, or Aleut	68
Asian or Pacific Islander	28	Percent of occupied units	1.5
Percent of total population	0.2	Asian or Pacific Islander	5
Other race	185	Percent of occupied units	0.1
Hispanic origin (of any race)	406	Other race	45
Percent of total population	3.5	Hispanic origin (of any race)	103
		Percent of occupied units	2.3

The user should note that there are limitations to many of these data. Please refer to the technical documentation provided with Summary Tape File 1A for a further explanation on the limitations of the data.

REFERENCE 9

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 GEMS>

Enter program execution mode: B (batch) or I (interactive)  
 GEMS> I

R. WICHERT PROPERTY

LATITUDE 35:29:24 LONGITUDE 98:58:41 1980 POPULATION

KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	0	0	0	3677	3124	0	6801
S 2	0	0	1172	0	0	0	1172
S 3	0	0	0	0	0	0	0
S 4	0	0	0	0	0	0	0
S 5	0	0	0	26	0	0	26
S 6	0	0	797	0	0	0	797
RING TOTALS	0	0	1969	3703	3124	0	8796

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 72 1172

compiled by LAB 5/12/92.

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REFERENCE 10

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## FAX TRANSMITTAL DOCUMENT

DATE: 5/15/92  
TO: Richard L. Brooks  
ORGANIZATION: OSDH - Solid Waste  
TELEPHONE: 271-7049  
FACSIMILE: FAX 271-7079  
NO. OF PAGES: 12  
INCLUDING COVER

### MESSAGES

IN response to your flood zone requests, only one of the 8 is in a designated flood zone.

CLINTON, Custer Co.

Community - panel # 400DS4 000S, effective date 4-3-87,  
Flood Bndry Floodway map 5234527 are in the SE corner of town  
& both section lie in ZONE C. FBFM.

Payne Co.

Community - panel # 40D493 0200C, map revised 2-5-92, Flood  
Insurance Rate Map or FIRM. all of section 2 is in Zone X, as well  
as the adjacent sections.

FROM: Ken MORRIS  
DIVISION: Planning  
TELEPHONE: 231-2533

OKC FAX NO. : (405) 231-2600

OKLAHOMA WATER RESOURCES BOARD  
P.O. BOX 150 - 600 N. HARVEY AVE.  
OKLAHOMA CITY, OKLAHOMA 73101-0150



Date: May 14, 1992  
To: Ken Morris, OWRB  
From: Richard Brooks, OSDH  
Page 2 of 2

Site	General Location
Oklahoma Steel & Wire	W2 SW4 SE4 SE4 SEC34 T05S R05E Marshall County <i>not in flood prone</i>
Sooner Dial Co.	SE4 NW4 NW4 SEC23 T12N R17W Custer County <i>not flood prone</i>
Raymond Wichert Property	E2 NW4 SE4 NE4 SEC27 T12N R17W Custer County <i>not flood prone.</i>
Borg Steel (TDR)	SW4 SW4 NW4 SEC32 T20N R13E Tulsa County <i>not.</i>
Deems Salvage Tonkawa	SE4 SEC15 T26N R02W Kay County <i>not</i>
Mid-Continent at Maid	SW4 SEC03 T20N R19E Mayes County <i>yes (see map attached)</i>
OSU Burial Site	NW4 NE4 NW4 SEC02 T18N R01E Payne County <i>no</i>
City of Eufaula Landfill	N2 SE4 SEC25 T10N R15E McIntosh County <i>no map printed for this area STIDHAM Pound 3595-24</i>

Joan K. Leavitt, M.D.  
Commissioner

**Board of Health**

John B. Carmichael, D.D.S.  
President  
Ernest D. Martin, R.Ph.  
Vice President  
Burdge F. Green, M.D.  
Secretary-Treasurer

Gordon H. Deckert, M.D.  
Dan H. Fleker, D.O.  
Linda M. Johnson, M.D.  
Walter Scott Mason, III  
Lee W. Paden

**OKLAHOMA STATE  
DEPARTMENT OF HEALTH**

**1000 NE TENTH  
OKLAHOMA CITY, OK  
73117-1299**

AN EQUAL OPPORTUNITY EMPLOYER



May 14, 1992

Ken Morris  
Planning Division  
Oklahoma Water Resources Board  
6000 N. Harvey  
P.O. Box 150  
Oklahoma City, OK 73101-150

Dear Mr. Morris:

The purpose of this letter is to request information regarding the flood potential of each of the sites listed in the following page. The information provided by your office will be used in the preliminary site assessments conducted by the OSDH, as authorized by a cooperative agreement with the U. S. Environmental Protection Agency.

If you have any questions or comments, please call me at (405) 271-7049.

Sincerely,

A handwritten signature in cursive script, appearing to read "Richard L. Brooks".

Richard L. Brooks, R.S.  
Senior Environmental Specialist

Attachment

Date: May 14, 1992  
To: Ken Morris, OWRB  
From: Richard Brooks, OSDH  
Page 2 of 2

Site	General Location
Oklahoma Steel & Wire	W2 SW4 SE4 SE4 SEC34 T05S R05E Marshall County
Sooner Dial Co.	SE4 NW4 NW4 SEC23 T12N R17W Custer County
Raymond Wichert Property	E2 NW4 SE4 NE4 SEC27 T12N R17W Custer County
Borg Steel (TDR)	SW4 SW4 NW4 SEC32 T20N R13E Tulsa County
Deems Salvage Tonkawa	SE4 SEC15 T26N R02W Kay County
Mid-Continent at Maid	SW4 SEC03 T20N R19E Mayes County
OSU Burial Site	NW4 NE4 NW4 SEC02 T18N R01E Payne County
City of Eufaula Landfill	N2 SE4 SEC25 T10N R15E McIntosh County



**REFERENCE 11**

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## OVERSIZE DOCUMENT

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Oversized document number:

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SF SA VOL 01

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Titled:

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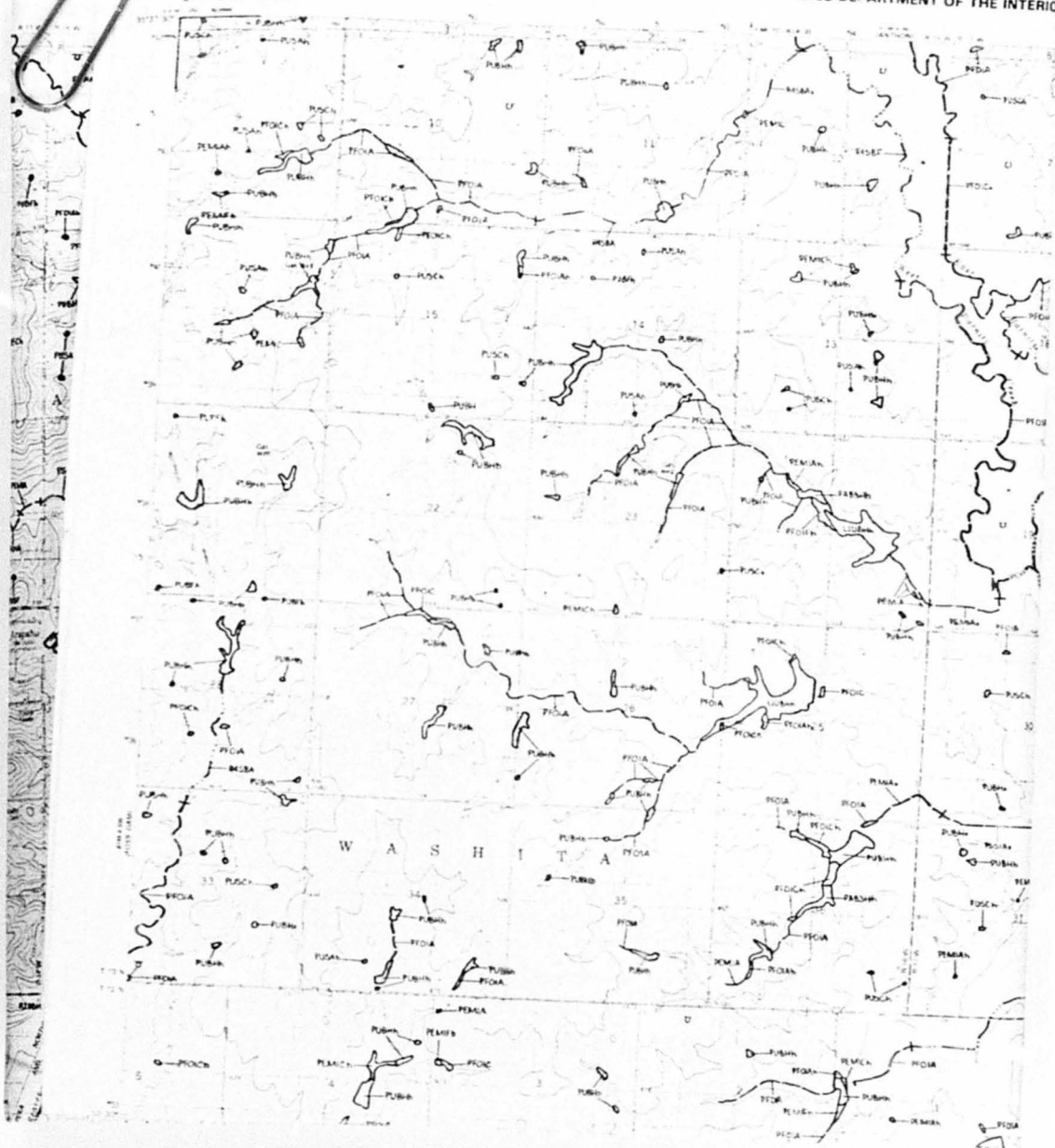
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## STAFFORD OKLA

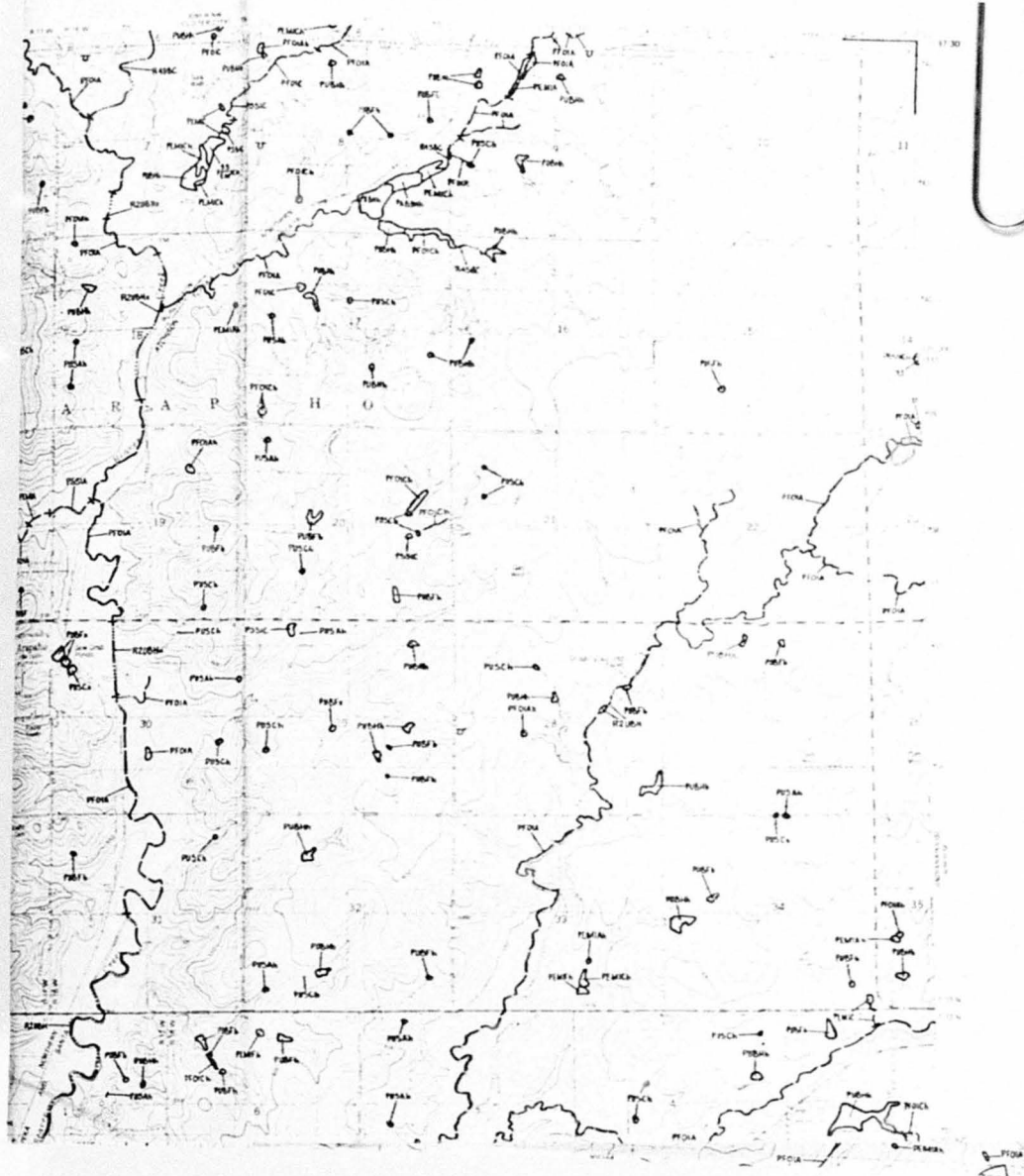


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# NATIONAL WETLANDS INVENTORY UNITED STATES DEPARTMENT OF THE INTERIOR

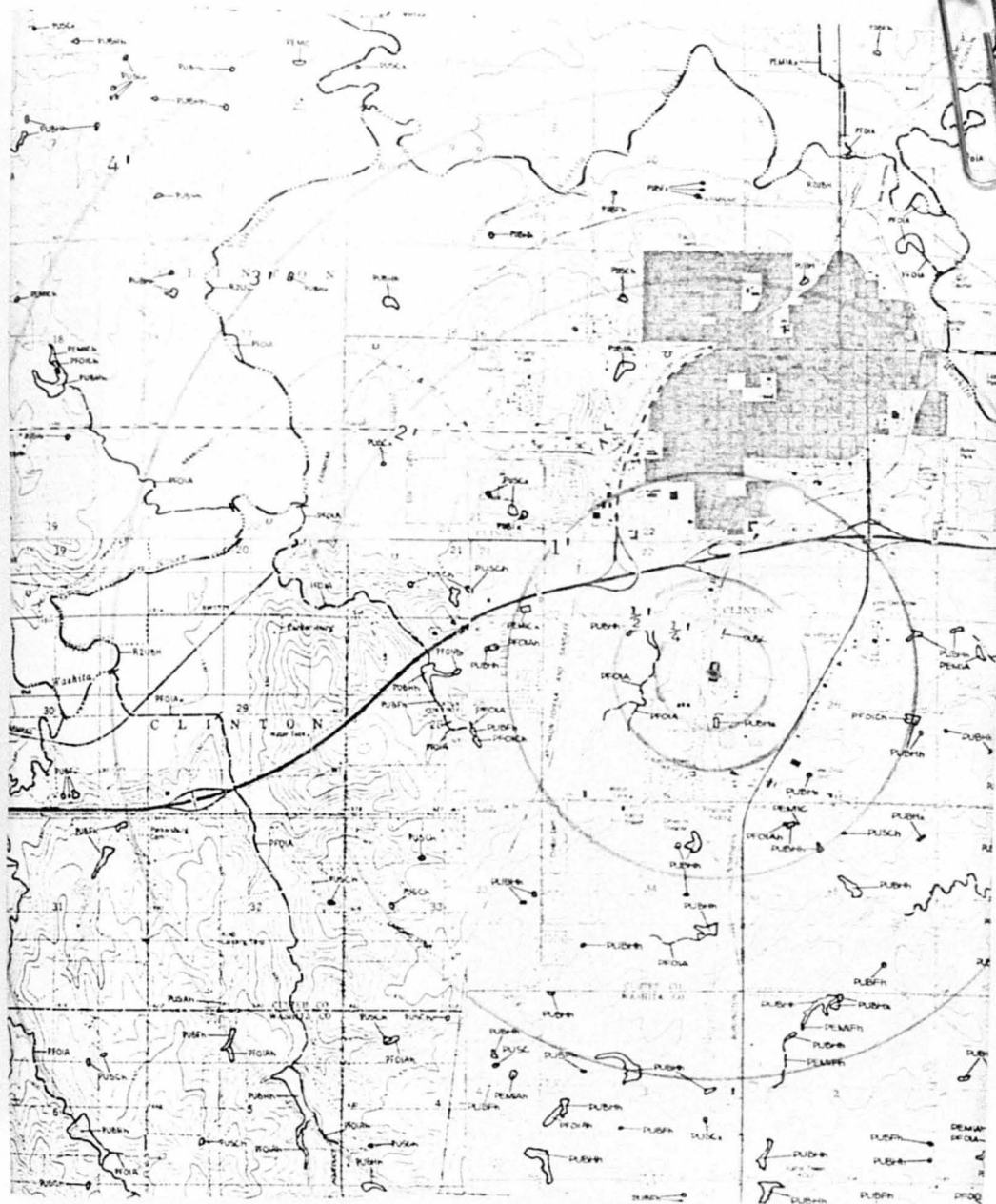


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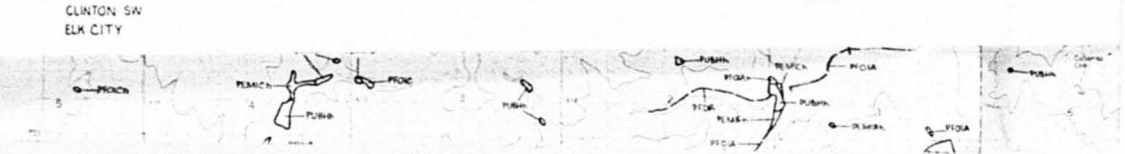
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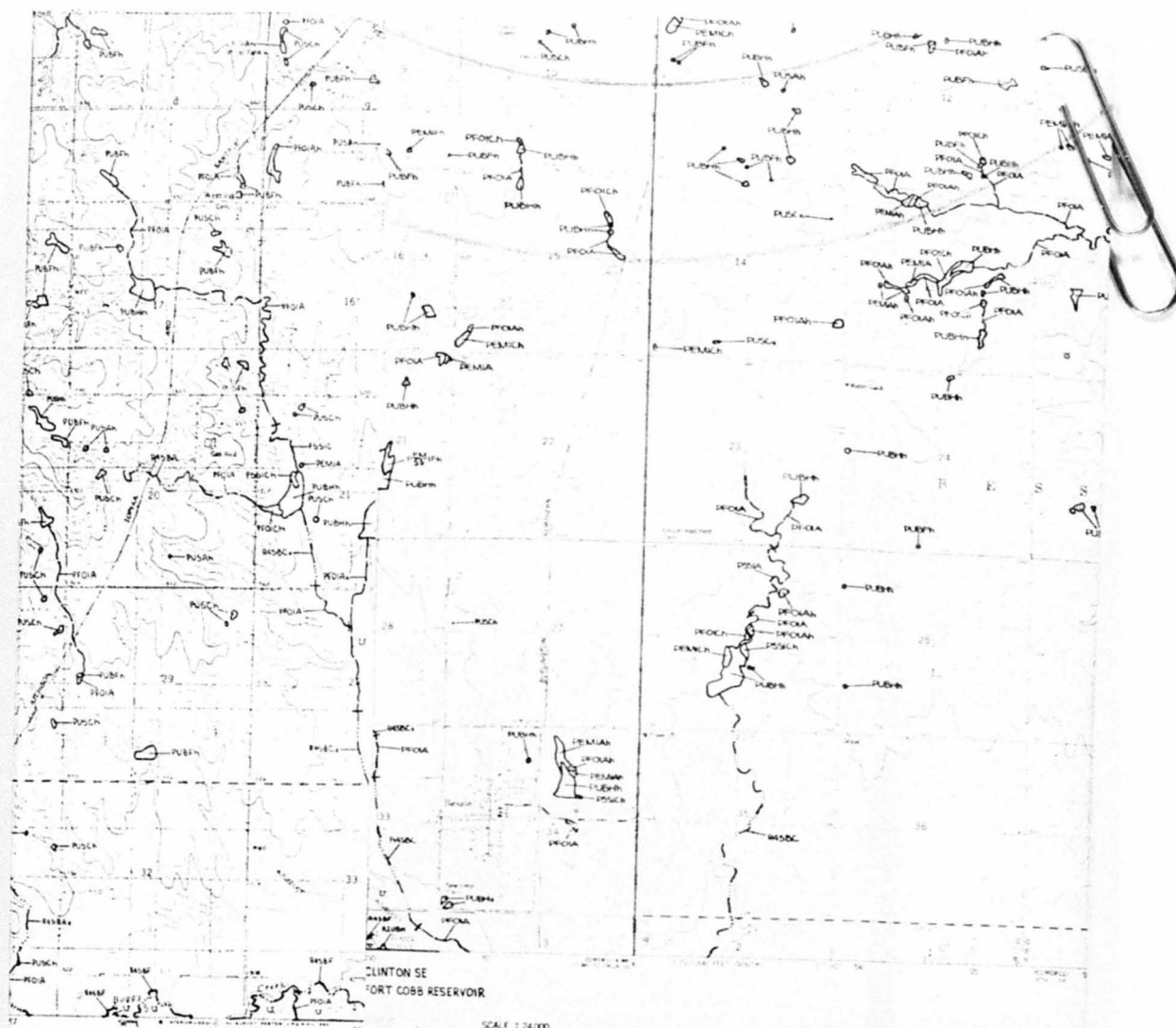


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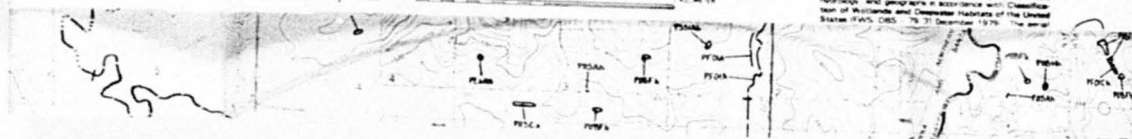
CLINTON SW  
ELK CITY





**SPECIAL NOTE**  
This document was prepared primarily by descriptive analysis of high altitude aerial photography. Wetlands were identified on the principle basis of vegetation, visible hydrology, and geomorphology in accordance with Classification System of Wetlands and Deepwater Habitats of the United States (FWS, OCS - 75-27 December 1975). The aerial

**SYMBOLS EXA**







1 acre

10 acres  
ACREAGE GUIDE

20 acres

Other information including a narrative report concerning the wetland resources depicted on this document may be available. For information, contact:

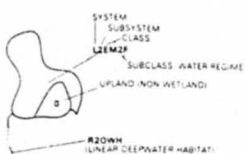
Regional Director (AROE) Region II  
U.S. Fish and Wildlife Service  
P.O. Box 1306  
Albuquerque, New Mexico 87103

#### SPECIAL NOTE

This document was prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands were identified on the photographs based on vegetation, visible hydrology, and geomorphology in accordance with Classification of Wetlands and Deepwater Habitats of the United States (FWS/OBS-78-31, December 1978). The aerial photographs typically reflect conditions during the specific year and season when they were taken. In addition, there is a margin of error inherent in the use of the aerial photographs. Thus, a detailed on the ground and historical review of a single site may result in a revision of the wetland boundaries established through photographic interpretation. In addition, some small wetlands and those obscured by dense forest cover may not be included on this document.

Federal, State and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this document. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, State or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, State or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect

#### SYMBOLS EXAMPLE



□ = Primarily represents upland trees, but may include uncultivated wetlands such as riparian forest, etc.



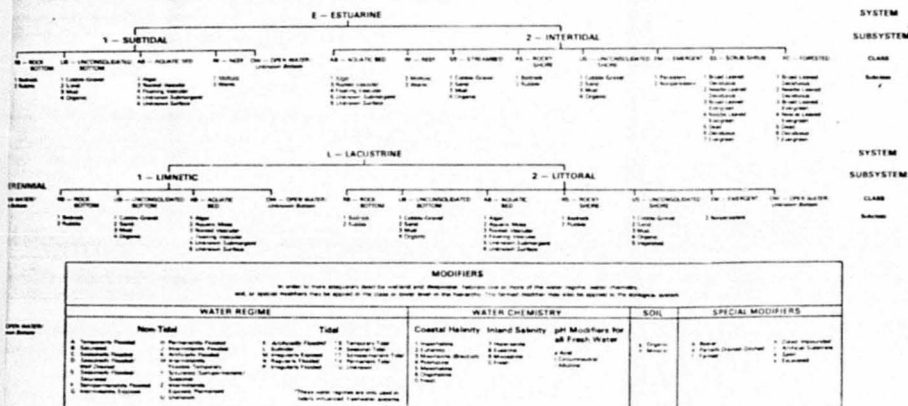


REGIME

## AERIAL PHOTOGRAPHY

DATE 10/81 DATE \_\_\_\_\_  
SCALE 158000 SCALE \_\_\_\_\_  
TYPE CIR TYPE \_\_\_\_\_

1989



REFERENCE 12

0571



U.S. Fish & Wildlife Service  
JUL 24, 1991

RECEIVED  
OCT 29 1991  
Solid Waste Service

OKLAHOMA FEDERAL LISTED, PROPOSED,  
AND CANDIDATE (Cat. 1 & 2) T/E SPECIES  
October 17, 1991

COUNTY	SPECIES	CLASSIFICATION
Adair	Gray bat	Endangered
	Ozark big-eared bat	Endangered
	Peregrine falcon	Endangered
	Ozark chinquapin	Category 1 Candidate
	( <i>Castanea pumila</i> var. <i>ozarkensis</i> )	
	Royal catchfly ( <i>Silene regia</i> )	Category 2 Candidate
	Bat Cave Isopod	Category 2 Candidate
	Ozark Cave Amphipod	Category 2 Candidate
	Migrant loggerhead shrike	Category 2 Candidate
	Eastern small-footed bat	Category 2 Candidate
Alfalfa	Peregrine falcon	Endangered
	Bald eagle	Endangered
	Interior least tern	Endangered
	Piping plover	Threatened
	Whooping crane C/H	Endangered
	Arkansas River shiner	Category 1 Candidate
	Arkansas River speckled chub	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Mountain plover	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
	Swift fox	Category 2 Candidate
Atoka	Bald eagle	Endangered
	Piping plover	Threatened
	Cumberland sand grass	
	( <i>Calamovilfa arcuata</i> )	Category 2 Candidate
	Small-headed pipewort	
	( <i>Eriocaulon kornickianum</i> )	Category 2 Candidate
	Alligator snapping turtle	Category 2 Candidate
	Migrant loggerhead shrike	Category 2 Candidate
Beaver	Bald eagle	Endangered
	Interior least tern	Endangered
	Whooping crane	Endangered
	Peregrine falcon	Endangered
	Arkansas River shiner	Category 1 Candidate
	Arkansas River speckled chub	Category 2 Candidate
	Arkansas darter	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Mountain plover	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
	Swift fox	Category 2 Candidate
Beckham	Whooping crane	Endangered
	Interior least tern	Endangered
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
Blaine	Bald eagle	Endangered
	Black-capped vireo	Endangered
	Interior least tern	Endangered
	Piping plover	Threatened
	Whooping crane	Endangered
	Arkansas River shiner	Category 1 Candidate
	Arkansas River speckled chub	Category 2 Candidate

Craig	Peregrine falcon	Endangered
	Neosho madtom	Threatened
	Western prairie fringed orchid	Threatened
	Prairie mole cricket	Proposed Threatened
	Neosho mucket	Category 2 Candidate
	Paddlefish	Category 2 Candidate
	Arkansas darter	Category 2 Candidate
	Blue sucker	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	Alligator snapping turtle	Category 2 Candidate
	Migrant loggerhead shrike	Category 2 Candidate
Creek	Peregrine falcon	Endangered
	Bald eagle	Endangered
	Interior least tern	Endangered
	Piping plover	Threatened
	Prairie mole cricket	Proposed Threatened
	Carex fissa	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
	Migrant loggerhead shrike	Category 2 Candidate
Custer	Bald eagle	Endangered
	Whooping crane	Endangered
	Interior least tern	Endangered
	Peregrine falcon	Endangered
	Arkansas River shiner	Category 1 Candidate
	Arkansas River speckled chub	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
Delaware	Gray bat	Endangered
	Ozark big-eared bat	Endangered
	Peregrine falcon	Endangered
	Bald eagle	Endangered
	Piping plover	Threatened
	Ozark cavefish	Threatened
	Prairie mole cricket	Proposed Threatened
	Ozark chinquapin	Category 1 Candidate
	(Castanea pumila var. ozarkensis)	
	Royal catchfly (Silene regia)	Category 2 Candidate
	Ozark spiderwort	
	(Tradescantia ozarkana)	Category 2 Candidate
	Lake cress	
	(Armoracia aquatica)	Category 2 Candidate
	Ozark cave crayfish	Category 2 Candidate
	Neosho mucket	Category 2 Candidate
	Paddlefish	Category 2 Candidate
	Blue sucker	Category 2 Candidate
	Arkansas darter	Category 2 Candidate
	Migrant loggerhead shrike	Category 2 Candidate
	Eastern small-footed bat	Category 2 Candidate
Dewey	Whooping crane	Endangered
	Bald eagle	Endangered
	Arkansas River shiner	Category 1 Candidate
	Arkansas River speckled chub	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
	Swift fox	Category 2 Candidate

Texas	Bald eagle	Endangered
	Interior least tern	Endangered
	Whooping crane	Endangered
	Peregrine falcon	Endangered
	Arkansas River shiner	Category 1 Candidate
	Arkansas River speckled chub	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
	Mountain plover	Category 2 Candidate
	Swift fox	Category 2 Candidate
Tillman	Interior least tern	Endangered
	Whooping crane	Endangered
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
Tulsa	Texas kangaroo rat	Category 2 Candidate
	Peregrine falcon	Endangered
	Bald eagle	Endangered
	Interior least tern	Endangered
	Piping plover	Threatened
	Prairie mole cricket	Proposed Threatened
	Paddlefish	Category 2 Candidate
	Arkansas River shiner	Category 1 Candidate
	Arkansas River speckled chub	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
	Migrant loggerhead shrike	Category 2 Candidate
Wagoner	Peregrine falcon	Endangered
	Bald eagle	Endangered
	Interior least tern	Endangered
	Piping plover	Threatened
	Prairie mole cricket	Proposed Threatened
	Ozark spiderwort ( <u>Tradescantia ozarkana</u> )	Category 2 Candidate
	Paddlefish	Category 2 Candidate
	Blue sucker	Category 2 Candidate
	Arkansas River shiner	Category 1 Candidate
	Arkansas River speckled chub	Category 2 Candidate
	Alligator snapping turtle	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	Migrant loggerhead shrike	Category 2 Candidate
Washington	Peregrine falcon	Endangered
	Bald eagle	Endangered
	Piping plover	Threatened
	Prairie mole cricket	Proposed Threatened
	Ozark chinquapin ( <u>Castanea pumila</u> var. <u>ozarkensis</u> )	Category 1 Candidate
	Alligator snapping turtle	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
	Mountain plover	Category 2 Candidate
Washita	Migrant loggerhead shrike	Category 2 Candidate
	Whooping crane	Endangered
	Prairie mole cricket	Proposed Threatened
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate

REFERENCE 13

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## WETLAND ACREAGE WORKSHEET

SITE: Raymond Wichert Property

Listed below are the estimated wetland acreage within four miles of the stated site. The acreages was derived by summing all designated wetland areas for each study radius with the use of the "Wetland Acreage Guide" of the appropriate inventory maps.

STUDY RADIUS (mi)	ESTIMATED WETLAND SIZE (acres)
On-site	0
0 - 1/4	1
1/4 - 1/2	2.5
1/2 - 1	9
1 - 2	40
2 - 3	60
3 - 4	75
<b>TOTAL</b>	<b>187.5</b>

### Source of Information:

U.S. Department of Interior. *National Wetlands Inventory Quadrangle Maps:*

1. Bessie, Okla.
2. Dill City NE, Okla.
3. Stafford, Okla.
4. Clinton, Okla.

Compiled by: Karen Khalafian Date: 05.19.92